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International Conference for Entrepreneurship,
Innovation and Regional Development

University-Industry Links: Coproducing Knowledge, Innovation & Growth

31 Aug – 1 Sept 2017

Makedonia Palace Hotel
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Conference Proceedings

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Prof Panayiotis Ketikidis & Dr Adrian Solomon

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TABLE OF CONTENTS

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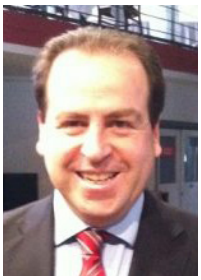

Prof. Panayiotis H. KETIKIDIS

Prof. Tim VORLEY

It is a great pleasure for us, the University of Sheffield International Faculty, CITY College, together with the South East European Research Centre (SEERC) to welcome you to the 10th International Conference for Entrepreneurship, Innovation and Regional Development (ICEIRD-2017) taking place on 31 August – 1 September 2017 in Thessaloniki, Greece.

Over the past 10 years, ICEIRD has become one of the leading entrepreneurship, innovation and regional development conferences in Europe, attracting academics and practitioners from around the world. ICEIRD over the past decade has focused on the importance of universities, industry and government, and how innovation-led growth can be promoted. As an innovative conference, which brings together academics, policymakers, practitioners, and businesses (companies), this year the theme of ICEIRD is to advance research and to practice university-industry links. The conference is structured around three themes focused on research, co-production and commercialisation through university-industry links.

With the initial submission of 202 papers, after the double blind, peer-review process there are 120 submissions accepted from 30 countries.

Thessaloniki is renowned for its unique location along the Thermaikos gulf, its sunset, its long history, its monuments and museums as well as its distinguished cuisine. We hope that all the delegates will have a successful conference, along with the chance to enjoy some of the traditional Greek hospitality for which our country is widely known.

We encourage you to use social media and share your ideas and insights beyond the conference and leave a digital ICEIRD2017 footprint.

We wish you to have an enjoyable conference and wonderful stay in Thessaloniki.

Best Regards,

Prof. Panayiotis H. KETIKIDIS

Vice Principal for Research, Innovation and External Relations, The University of Sheffield International Faculty, CITY College, Greece

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Chair in Entrepreneurship, Associate Dean Research (Income & Impact), University of Sheffield Management School, United Kingdom

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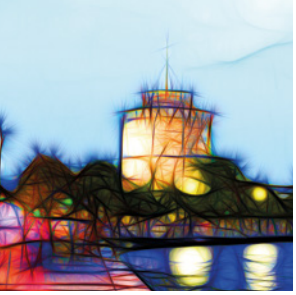

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OPEN SOCIAL INNOVATION: CHALLENGES AND OPPORTUNITIES

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This paper presents and discusses the various definitions, paradigms and perspective of Open Innovation on one hand and Social Innovation on the other hand, the role of the different actors and key approaches. Then, it is introduced and derived the definition of Open Social Innovation (OSI), as a unified approach, which would lead to sustainable growth. There are investigated good practices of open social innovation at the regions participating in INTERREG EUROPE project "OSIRIS-Open Social Innovation policies driven by co-creative Regional Innovation eco-systemS" along with a methodology to peer review their potential on adopting Open Social Innovation.

Keywords
Open Social Innovation, Peer Review, Potential, Regional Growth

1. Introduction

The current paper makes an effort to better describe the definition of open social innovation, as little information exists in the bibliography. However, before presenting the definition of open social innovation, the reader has to be familiarized with the meanings of open and social innovation as separate and distinct definitions. Moreover, we discuss and present the importance and the role of the "key players" in fostering open innovation in a region, namely, the public and private sector, the academic world and the wider community. Indeed, the common collaboration of these entities is crucial for the promotion and adoption of open social innovation in a region. In addition, some key approaches to social innovation in relation to EU funding initiatives will be presented.
In the last part of the paper, open social innovation will be examined as the main motivator of regional development. It is widely accepted that innovation is the main and valuable cause of growth in a region/country and it is also a useful tool to address global challenges and social issues. Regions are seeking to sustain their economic and social development increasingly through innovation. They launch and implement strategies and policy instruments built on their strengths and overcome their weaknesses. Such an initiative is presented here, it is the EU funded project, "*OSIRIS-Open Social Innovation policies driven by co-creative Regional Innovation eco-systemS"* (INTERREG EUROPE). This project, through the implementation of a series of activities, aims to improve the current open innovation policies of the participating

in the project regions through co-creative regional eco-systems for innovation, co-creative cyclic good practices such as the innovation loop and the peer review process.
This work puts special emphasis to the peer review process, which will be implemented with the contribution of the regional stakeholders and representatives from public and private sector, academia and the wider community. The outcomes from the peer review process aim to provide analytic assessment and policy advice for examining regions, evaluate the strength of the regional open social innovation system, the region's needs, and the strategic usage of the region's resources.

2. Open Innovation

Various definitions exist for "open innovation" with the one of Henry Chesbrough's to be the most widely used and accepted. This terminology was introduced in his book "*Open Innovation: The new imperative for creating and profiting from technology,* 2003 [1]. Later on, Chesbrough further defined open innovation as the implementation of purposive inflows and outflows of knowledge to accelerate internal innovation, and expand the markets for external use of innovation, respectively. Open innovation is a paradigm that assumes that firms can and should use external ideas as well as internal ideas, and internal and external paths to market, as they look to advance their technology [2].
Any open innovation process is consisted at least of research and development stages. The research phase includes, in most, times inputs from the outside boundaries of the company [3]. Many companies have already provided successful examples of implementing the open innovation model to solve problems and adopt innovative solutions such as IBM that patterned with other companies to develop semiconductor technologies [4]. Apple and P&G implemented open innovation to develop new products such as the early iPad and Swiffer; and many other good practices.
According to Chesbrough, when a company adopts open innovation, the organization's boundaries become permeable so that to allow interacting and combining the company's resources with the external co-operators. On the other hand, the closed innovation companies innovate by using only their internal resources, in most of the times inside their R&D department; so during the innovation process, all proposed ideas are evaluated and only the most promising ones are selected for their development and commercialization. In this case the ideas, inventions and suggestions are generated within the company. However, when applying the open innovation system, the company can use external resources, such as advances in technology and at the same time company makes available their own innovations to other organizations.
From another perspective, open innovation should be viewed as a two -way process, where companies have an inbound process in which they bring in ideas, technologies, or other resources needed to develop their own business and an outbound process in which they out-license or sell their own ideas, technologies and resources [5]. This two-way approach should take place during all stages of the innovation process. Other authors, state that the basic requirement for open innovation is opening up the innovation process [6]. Moreover, companies should cooperate with organizations activating in their region (universities, researchers and consultants) and exploit the knowledge and experience of their customers [7]. Often, open innovation is described as the integration of consumers and users, or even competitors, to make use of the wisdom of crowds [8].

2.1 Different Actors in Open Innovation

Open innovation is most likely to succeed when the needs and opportunities of the entire innovation ecosystem of sources and supporters are organized in such ways that foster both competition and collaboration. Therefore, the public sector, the financial sector, the innovative businesses, academia and citizens have an essential role to play in delivering and promoting open innovation [9]:

- The public sector creates the regulatory environment and the legal framework and provides incentives, so that all the other actors to be able to operate. It enables the diffusion of knowledge and fosters common collaboration. Moreover, it provides a collaborative environment among the economic actors involved in order to enhance productivity and value.
- The financial sector. The access to funding sources is a common barrier for the owners of innovative ideas. The creation of a friendly financial environment -providing tools, funding schemes and enabling the operation of funding organizations- would significantly contribute to the support of open innovation. It is widely accepted that investors of all kinds are willing to invest in innovation.
- Innovative businesses. In order the businesses to be able to bring innovations to the market, they want to be able to maximize their returns on the resources allocated to innovation.
- Academia. Research centers, universities and higher education institutions have a key role in the innovation eco-system, both as knowledge producers and as a pool of skilled human capital. Challenges for this part of the ecosystem refer to the co-creation capabilities of universities, the design of incentives for academics when working with users and the absorptive capacity of academic knowledge within firms.
- Citizens/community. Citizens and civil society organisations have an important role to play in bringing innovation to the market. They create a demand for innovative products and services and their needs provide the directions where innovation has to be driven. Therefore, they perform the source of innovative ideas and play a crucial role in what research is meaningful to them and can impact their lives.

3. Social Innovation

There is a vague on what could be categorized as social innovations and what the difference to the general innovations is. There would be included new products, services, markets, processes that meet needs of society and provide to the general public new and improved capabilities so that to better exploit their assets and resources. In other words, social innovations are both good for society and enhance society's capacity to act [10]. They could stem from the citizens' inventiveness, civil society associations and needs, local communities' activities, businesses and services. They meet the requirements of both the public sector and the markets, so that the produced products and services satisfy both individual needs but also collective aspirations. Social innovation has to respond to social needs to produce better social outcomes. Social Innovation is consisted of four main elements: [11]

- Identification of social needs and society's requirements

- Investigate, design and develop novel approaches and solutions in response to these social needs
- Evaluating the effectiveness of the suggested solutions and their correspondence to the needs and requirements
- Scaling up effective social innovations.

3.1 Key definitions for Social Innovation

European Commission has put much of focus on social innovation and Bureau of European Policy Advisors (BEPA) suggested the following three approaches towards social innovation [12]:

- *Social demand innovations,* are dealing with social demands that are usually not addressed by the market or existing institutions and are addressed towards vulnerable social groups. These innovations develop new approaches in order to overcome problems affecting young people, the elderly and socially excluded people and others.
- *The societal challenge* perspective focuses on innovations for society as a whole through the integration of the social, the economic and the environmental needs.
- *The systemic change* focus, is achieved through a process of organizational development and changes in relations between institutions and stakeholders.

Social innovation is considered distinct to economic innovation; because social innovation "is not about introducing new types of production or exploiting new markets for the sake of exploiting them, but is about satisfying new needs not provided by the market (even if markets intervene later) or creating new, more satisfactory ways of insertion in terms of giving people a place and a role in production" [13]. Based on LEED's Forum "social innovation seeks new answers to social problems by: identifying and delivering new services that improve the quality of life of individuals and communities" and "identifying and implementing new labour market integration processes, new competencies, new jobs, and new forms of participation, as diverse elements that each contribute to improving the position of individuals in the workforce" [13].

Furthermore social innovation is defined as the creation of long-lasting outcomes that aim to address societal needs by fundamentally changing the relationships, positions and rules between the involved stakeholders, through an open process of participation, exchange and collaboration with relevant stakeholders, including end-users, thereby crossing organizational boundaries and jurisdictions [14], [15],[16],[17],[18].

But social innovation requires the intervention of private sector, where co-creation is based on two trends. Corporations are challenged to produce their goods more efficiently. As a result, end-users are defined as possible co-producers who have specific role in the production chain [19], [20], [21]. In addition to this, end-users may become co-creators whose experiences with products or services could have added value for a company. End-users are an interesting source of product and service innovation. As a result, research showed that co-creation not only influences customer satisfaction and loyalty, but also lead firms to achieve competitive advantage [22]. On the other hand, for the public sector, these end-users are citizens. According to the European Commission [23], social innovation mobilizes each citizen to become an active part of the innovation process. If citizen participation is considered as a necessary condition for social innovation in the public sector, it is important that we have

systematic knowledge regarding the conditions under which citizens are prepared to embark on the 'social innovation journey [24].

4. Open Social Innovation

Chesbrough defines open social innovation as the application of either inbound or outbound open innovation strategies, along with innovations in the associated business model of an organisation, to meet social challenges [25]. Open social innovation can occur using the collaborative processes of open innovation to generate benefits for the collective good (represented by new solutions to social problems or changes in social practices). The process of open innovation also stimulates new innovations generated at no cost which can be replicated in other contexts. This process can also result in the formation of collaborative networks in which it is possible to provide innovative ideas and exchange knowledge and ideas with individuals from other contexts and locations. [26]
Open innovation can create better solutions for social needs. As Chalmers (2013) demonstrates [27], increasing the number of users in the generation of social innovation through open innovation, mitigates the risks of introducing innovations because they are generated from a wide range of expertise that complement each other. To evaluate this proposition, social challenge ideas or other cases of open innovation could be investigated with respect to their impact in a specific area. Focusing on regional level, according to Neumeier (2012) [28], the problems of a region and the necessary actions to address them, are better perceived by the citizens of this region. The implementation of strategies based on such local perceptions is attracting more attention from public administration officials. In the case of the social challenge ideas, an analysis of what can be extracted from the suggested ideas and how the government uses this information may indicate how the knowledge captured in a network can be used in collaboration with public management.
The definition of open social innovation is not yet mature and widely accepted. We could better describe it, if we take as principle that open innovation achieves efficiency and effectiveness and social innovation meets social needs and lead to changes in social practices. Within an open social innovative environment is crucial the collaboration among private and public sector after having feedback from the community regarding their needs.

4.*1 Regional Open social innovation*

The openness of innovation processes for external expertise, which includes the broad participation of stakeholders, is central in the open innovation approach. Opening up innovation processes purposely for additional knowledge and ideas from outside has become an important strategy for leading industries to cope with changing environmental conditions and to compete effectively in the market [29,30]. Open social innovation strategies are used to open regional innovation systems and to enhance the innovation ecosystems at various European regions.
An initiative towards open social innovation is the EU funded project *"OSIRIS-Open Social Innovation policies driven by co-creative Regional Innovation eco-systemS"* (INTERREG EUROPE) [31]. OSIRIS aims at improving design, rapid delivery and implementation of open social innovation policies and action plans through co-creative regional eco-systems for

innovation, co-creative cyclic good practices, the innovation loop and peer review process. Policy-makers' innovation management skills and co-creativity will be accelerated by interregional collaboration in focused sectors and disciplines, adopting the penta-helix model (government-research-business-citizens-society), empowering the public information sector. Therefore, within the frames of the project, several activities have and will take place (it is an ongoing project) in order to identify open social innovation good practices in each region and examine the regional potential to promote and adopt open social innovation practices. For this purpose, a peer review process was designed, to investigate the stakeholders view and perspective of each corresponding region and co-product recommendations and guidelines to support policy-makers to design and implement open and collaborative government environments for open and social innovation, to boost regional innovation development and raise the innovation leadership competence.

4.2 Peer review methodology

Generally speaking, peer review is the detailed evaluation of a task, a project or policy by one or more people of similar competence to the producers of the task/project/policy (peers). It constitutes a form of self-regulation and self-assessment by qualified members of a profession within the relevant field. Peer review approaches are employed to maintain standards of quality, improve performance and provide credibility.
Within OSIRIS, we design a peer review process to investigate the potential of involved regions in open social Innovation. We have identified the stakeholders to whom the interviews for the peer review process are addressed: innovation facilitators, representatives of private companies, research institutes, universities, representatives of regional authorities responsible for launching policy tools, representatives of regional development agencies and any other stakeholder consisted the penta-helix model at regional level. The competence fields under consideration are: regional policies and initiatives, education and human resources, innovative environment, innovation leadership, partnerships, social environment and needs, open social innovation. The peer review process is applied in an open co-working event where all the stakeholders of each region participate. The event starts with the in depth presentation and study of the definitions of open and social innovation, then stakeholders reply to the questions dealing with their own region, they present their problems and barriers that they have faced. Much attention is put in investigating whether the regional policy framework, as it is outlined by the RIS, encourages and allows them to implement open social innovation practices and it is asked them to identify towards which direction the open social innovation initiatives shouldbe focused on their own region.
In briefly, the regional stakeholders have to study, justify and reply to the following questions:

- Which is the main problem in your region that hinders open and social innovation?
- Which are the main challenges that OSI would meet?
- How does the region support and enhance cooperation of different actors in order to foster open innovation based on social aspects?
- In which fields are mostly met the social needs, where innovation can play a significant role?
- Which are the policy tools responsible for the financial support on regional innovation?

- What measures should be further facilitated by the regional authorities /decision making authorities in order to enable your organization to promote regional open social innovation?
- Does RIS3/ Operational Programme include Priority Axis and measures towards Open and Social Innovation?
- Are at your region practices and initiatives belonging to Open and Social Innovation?
- Are OSI related issues where there is a strong political will to move on, and get new recommendations?

The co-creation open event continues and after answering these questions, the participants of the co-working group discuss and suggest possible options for peers to improve the local policy process and strength open social innovation.
The peer review process began on October 2016 and was finalized on the end of March 2017, following the aforementioned methodology. The regions and the corresponding stakeholders involved were the ones of Western Greece and Region of Epirus.

5. Conclusions and Future Work

This paper serves as an introduction to the different definitions of open innovation, social innovation and open social innovation. There are presented the key elements of each definition and meaning and we have come to the conclusion that in order to foster open social innovation in a region, is essential the collaboration among the public sector, innovative businesses, research and academic world and the society who play an important and complementary role in open social innovation as the needs deriving from the wider society are those that indicate where the OSI will focus on.
Moreover, we have presented open social innovation through the perspective of project OSIRIS, an EU funded project that aims to foster open social innovation in European regions and contributes to their sustainable growth. There have been briefly described the series of activities that will be implemented in the project but special attention has given in the peer review methodology followed so that the regional stakeholders and policy makers to identify the potential of open social innovation in their regions. In our future work, we will present the results from the peer review process from various European regions and we will present and compare the qualitative and quantitative results of peer review process.

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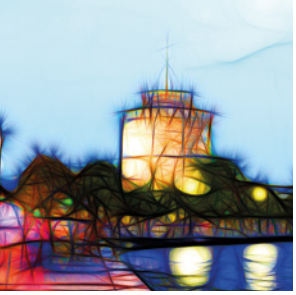

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ADDRESSING KNOWLEDGE MANAGEMENT AND PROVIDING OPEN INNOVATION FOR SME'S AND LARGER COMPANIES IN THE SCOPE OF THE INNOKICK ACADEMIC PROGRAM

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1. Introduction

In this article we explain the innovation management process around the new Master of Science in Integrated Innovation for product and business development (Master Innokick) launched in September 2015 by the University of Applied Science and Arts Western Switzerland (HES SO).
The aim of our academic program is dual-faceted: First it provides a multi-disciplinary education program in product and service innovation for students holding a bachelor degree either in Engineering, Business Administration or Design. Second, it offers the opportunity to a selected set of SME's, start-ups or larger organizations (a total of five per year) to garner fresh perspectives for their business by taking part to a one-year project supported by students (typically groups of 8 to 10) and their coaches, both from academia and industry.
During this first year of the program the students are divided into five interdisciplinary groups. To achieve that goal, we mix in each group at least two engineers, two economists and two members with a background in design or visual arts.
The interdisciplinary setting lays the foundation for having the necessary skills for the development of innovative products or services. Cross-disciplinary collaboration is central in the program, as is the close cooperation with external companies. During the program, students develop prototypes and mockups of applications, products, and business model. [1]
During the projects, students work in groups and adopt an approach concentrating on technology (technology push) and business opportunities (market pull). They have the opportunity to carry out development work in collaboration with research laboratories at leading universities or to undertake consulting projects for outside businesses. Projects are divided into four stages:

- An idea generation (brainstorming) stage designed to help students with an aim to put together a portfolio of potential new applications of the technology or business idea they have chosen;

- A concept -selection and validation- stage where students identify the most commercially viable ideas and develop the communication tools – drawings, models, videos – they need to be able to 'sell' their most promising ideas to future users;

A strategic (development) stage which involves conducting ethnographic market research and describing a business opportunity consistent with the strategy of the partner laboratory or business;

- Finally, an implementation stage which involves testing the technological feasibility of the project, deploying the marketing and production plan for the product and/or service and including it in the portfolio of existing products and new product development.

As shown in the following figure, theoretical courses (blue bubbles) are provided in support for each of the development stages (as listed above) of the project

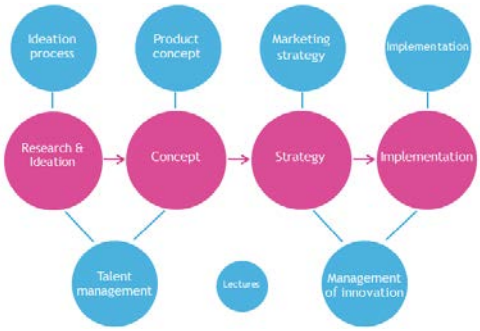

Figure 1 Master Innokick Program Study Plan [2]

Although the entire process is actually iterative, the contribution presented in this article focuses in particular on the first phase of development, i.e. on the "Ideation" part of it. Once they have become acquainted with their project topic, student groups go through several brainstorming sessions to generate as many ideas as possible. Brainstorming sessions use different types of tools to stimulate participants' creativity. During this creative phase, participants tend not to discard ideas too quickly, because some might be of interest later (e.g. once the team gets a better grasp of their topic). In effect, generated ideas are subsequently selected (with various criteria) in order to select the most promising ones.

Our approach aims at managing innovation starting from project inception stage by leveraging a tool-supported set of knowledge management processes spanning idea generation to idea selection. As a result, we put an emphasis on long-term knowledge management and reuse with an aim at capitalizing on the acquired information across subsequent iterations of the program.

We manage all ideas issued from brainstorming using an idea management tool. The tool helps us manage the lifecyle of the ideas during the projects. Typically, the lifecycle of ideas is grounded into an iterative selection process with a goal to sort out potential solutions based on criteria. Criteria differ according to the selection stage (see Figure 2). At early stages, quick, "lightweight" selection methods are preferred because they allow us to sort through a large number of ideas. During this process, the tool provides us with a means to carry out selection and the advantage of leaving discarded ideas available for later "discovery", for example in a different project. Hence it is critical to capture ideas in a form that make them easily retrievable.

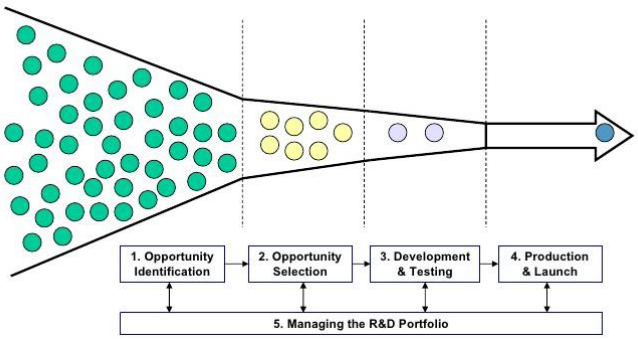

Figure 2 Illustration of the process of sorting ideas

2. Results

Our main contribution is thus to setting up a tool-supported framework such that we continuously leverage and benefit from previous creative efforts and palliate to the expected yearly reset due to the short span of the academic year. In particular, all ideas (typically hundreds per project),
Idea categories, research and analysis work are systematically stored and rendered fully searchable in order to be leveraged in future efforts. In addition, we aim at continuously defining and refining metrics, as well as methods such that we can assess key performance indicators around project efficiency and idea maturity. Indeed, the large number of ideas and attached artifacts enables us to perform qualitative research (e.g. using classification) to draw conclusions between the creative process and project success.

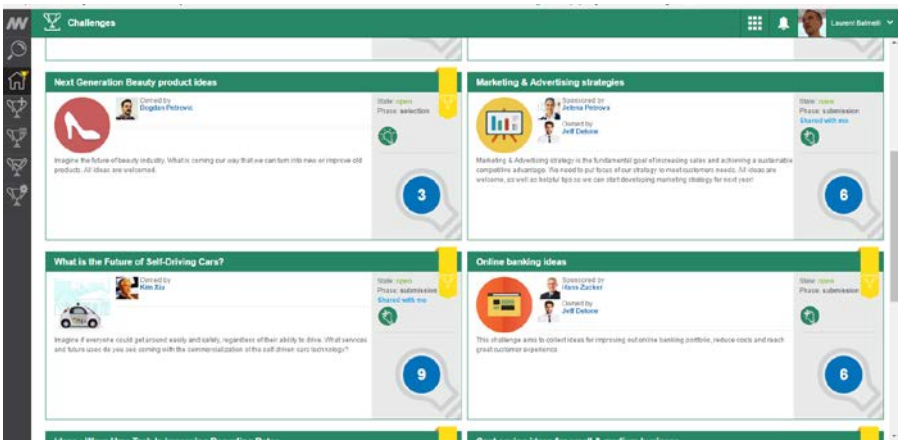

Figure 3 Screenshot of the open innovation platform

3. Conclusion

Our approach allows us to monitor the development of our five yearly innovation projects, the contributions of over 50 participants and foster reuse of findings and methods across teams and during subsequent years. In addition, from the perspective of our industrial partners, we provide an open innovation process that participating companies need to integrate in their operations. Hence an additional contribution in this work is an examination, in tandem with these participants, of the strategies and workings they typically put in place to benefit from our program (e.g. technology transfer and product roadmap integration). In our study, we include a range of Swiss SME's, including some with an international presence to larger companies with worldwide recognizable brands.

Abbreviations

HES SO University of Applied Science and Arts Western Switzerland

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1 Christian Koch, Nathalie Nyffeler; Let the grunts do it! – studying the embedding of a multidisciplinary master education in an educational institution ;2nd International Conference on Higher Education Advances, HEAd´16, 21-23 June 2016, València, Spain

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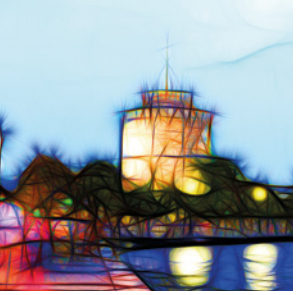

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TOWARDS THE DESIGN OF A REGIONAL-SENSITIVE DOMAIN FOCUSED HIGH TECH ENTREPRENEURSHIP PROGRAMME. A FOUR COUNTRY TRAINING NEEDS ANALYSIS

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The paper presents preliminary work on designing an inclusive, regional-sensitive and domain-focused high-tech entrepreneurship training programme[1]. It reviews the existing collaborative startup training initiatives at a global scale, along the views of young University students with an interest in entrepreneurship, startup mentors, local public authorities, and NGOs from four different cities [Thessaloniki (GR), Izmir (TR), Como (IT), Coimbra (PT)]. Through a mixed method approach (desk research for relevant training programmes, online questionnaire for the students, and roundtable discussions for the rest of the stakeholders in the four regions), a complete training needs analysis for entrepreneurial practice is performed, where the participants' views on a level of particular skill-sets and the rest of the stakeholders' strategic aspirations are investigated. The results indicate that both students and related stakeholders identify similar entrepreneurship training gaps centered on opportunity recognition and market validation, teamwork, and flexibility.

Keywords
Digital Entrepreneurship, Entrepreneurial Skills, Entrepreneurship Training, Start-up Training, Tech start-ups

1. Introduction

The growth of tech start-ups is an important investment opportunity and a potential competitive advantage for the EU and beyond. However, equipping young University students with appropriate generic entrepreneurship skills, along with contextual socio-economic regional knowledge is easier said than done. A fragmented European startup ecosystem

[1] Funded by the project "iSTART: A Lean-Training, Innovative, Multidisciplinary Digital Entrepreneurship Platform" (code no. 2016-1-TR01-KA203-034258), funded by the Erasmus+ Programme, Key Action 'Cooperation for innovation and the exchange of good practices', Action 'Strategic Partnerships'

landscape, a wide set of high-tech business domain peculiarities, varying individual training needs and diverse socio-economic geographical contexts make the task challenging. The current paper focuses on the training need particularities and the challenges associated with designing an entrepreneurship training programme aiming to promote digital entrepreneurship.

The importance of enterprise education is evident by the initiatives taken by the European Commission. Several policy calls are centered on the promotion of entrepreneurship both in relation to how academic institutions foster entrepreneurship, but also how enterprising graduates progress. A characteristic example is the European Commission's Entrepreneurship 2020 Action Plan which stresses the importance of entrepreneurship education on Europe's return investments [1].

However, the level of contribution of entrepreneurship education in the development of successful entrepreneurial projects is an issue of debate. Under the umbrella of entrepreneurship training, a large variety of courses with different context and content are delivered, the effects of which on students/potential entrepreneurs are difficult to be measured [2]. Nevertheless, there are two theoretical approaches that suggest that entrepreneurship education has at least a positive relation to **entrepreneurial intentions**. The first approach relates to the human capital theory [3] where human capital outcomes, such as entrepreneurship-related knowledge and a positive perception of entrepreneurship and intentions, show a strong positive relationship with entrepreneurship education [4]. The second approach refers to the entrepreneurial self-efficacy approach [5], which suggests that entrepreneurship education enhances entrepreneurial self-efficacy (i.e. having the confidence to perform tasks relevant to entrepreneurship), which in turn increases entrepreneurship intentions. More specifically, students receiving entrepreneurship training become acquainted with success stories of entrepreneurs who explain their strategies of success. In this way, their self-efficacy increases, and as their expectations of success increase, they become more motivated and interested in entrepreneurship [6].

In this respect, the main objectives in the design of an entrepreneurship training programme are two: on the one hand it has to increase entrepreneurship intentions, and on the other it needs to build trainees confidence in terms of their self-efficacy in entrepreneurship. In order to achieve that, a careful curriculum design process needs to take place, based on an analysis of the actual needs of the potential entrepreneurs and all related stakeholders.

Regarding the latter, the current literature on the design of entrepreneurship training programmes seems to highlight the importance of all related stakeholders in the design process. According to Penaluna *et al* (2012) [7], trainees gain more from their training experience when educators incorporate lessons learnt from personal start up experience, and when key stakeholders are involved in the development of curricula. Similarly, it is argued that entrepreneurship courses in higher education need to consider and address the needs of all stakeholders related to entrepreneurship education such as students, entrepreneurship academics and researchers, regional and national governments and all types of businesses [1]. Finally, in a recent study regarding entrepreneurship training in tertiary education, it has been suggested that outreach and engagement with the community and its businesses is essential for the success of entrepreneurship programs of tertiary education institutions [8].

Considering the above, the current paper involves the performance of a complete training needs analysis (TNA) for entrepreneurial practice, where the participants' views on a level of particular skill-sets and the rest of the stakeholders' strategic aspirations are investigated. The current study focuses on four countries (Turkey, Greece, Italy, and Portugal) and its

results constitute the preliminary work on designing an inclusive, regional-sensitive and domain-focused high-tech entrepreneurship training programme[2]. The methods and the results of the TNA are presented in the following sections of the paper.

2. Methodology & Sample

The current TNA reviews the existing collaborative startup training initiatives at a global scale, along the views of young University students with an interest in entrepreneurship, startup mentors, local public authorities, and NGOs from four different cities (i.e. Thessaloniki (GR), Izmir (TR), Como (IT), and Coimbra (PT). Through a mixed method approach (e.g. desk research for relevant training programmes, online questionnaire for the students and a semi-structured interview for the rest of the stakeholders in the four regions), the current entrepreneurial training practice, the participants' views on a level of particular skill-sets and the rest of the stakeholders' strategic aspirations are compared and contrasted.

2.1 Desk-based research

The first part of the study for the TNA involved a desk-based research. The aim of the desk-based research was to identify best practice start-up incubators & accelerators around the globe, and examine the type of services and training support they offer. For that reason, the information gathered for each of these cases involved:
Information for Stakeholders involved (e.g. industry/private incubator, university/research institute, local/national government/EU public funding, societal organizations/NGOs, other)

- Geographic region of activity
- Type of support service (e.g. Training, infrastructure, management consulting, business expertise, IT support, legal advice, etc)
- Business sector(s) focus of service, and
- Brief description of useful facts (e.g. achievements in numbers, training processes, success stories, etc.)

The final sample of the desk-based research was fifty three (53) cases from seventeen (17) countries. Table 1 includes all recorded cases by country of origin.

[2] Funded by the project "iSTART: A Lean-Training, Innovative, Multidisciplinary Digital Entrepreneurship Platform" (code no. 2016-1-TR01-KA203-034258), funded by the Erasmus+ Programme, Key Action 'Cooperation for innovation and the exchange of good practices', Action 'Strategic Partnerships'

Table 1 Best Practice Start-up Incubators & Accelerators

Country	Cases
Brazil	1
Bulgaria	2
Canada	3
Chile	1
Finland	5
Germany	3
India	4
Israel	7
Japan	2
Serbia	2
Singapore	2
Spain	3
Switzerland	5
The Netherlands	4
Tunisia	2
UK	3
USA	4
Total	**53**

2.2 Questionnaire Survey

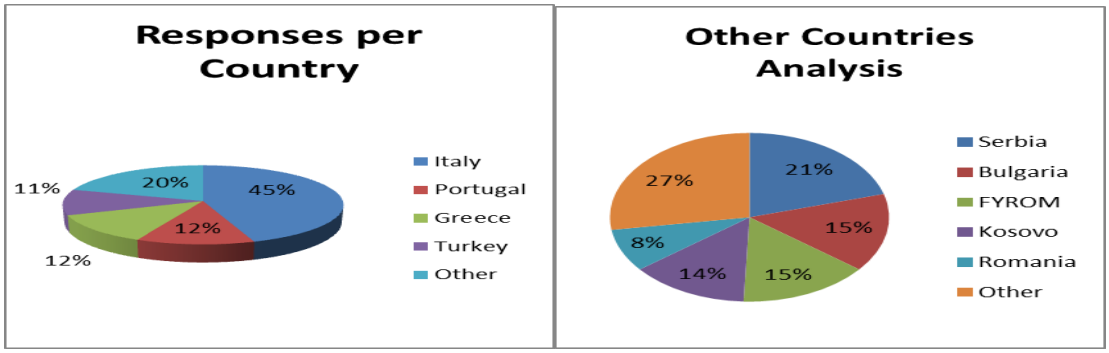
The second part of the TNA involved a questionnaire survey referring to students/potential entrepreneurs. An on line questionnaire was developed using Google Forms and it was distributed by all partners participated in the project (the questionnaire is available in the appendix). Participants were given a list of entrepreneurial skills separated in three categories (managerial/ communication & relational/ personal skills) and were asked to rate each skill on a scale of 1 to 3 as a) being significant to entrepreneurship, b) being personally familiar with?

The three categories of skills included the following skills:

- **Managerial:** opportunity recognition, problem solving, business planning, marketing, financial projections, pitching
- **Communication & Relational:** Communication and Presentation techniques, Team building and team working, Networking techniques, and Collaboration and Empathy
- **Personal:** Creative Thinking, Idea Generation, Flexibility and Stress Management

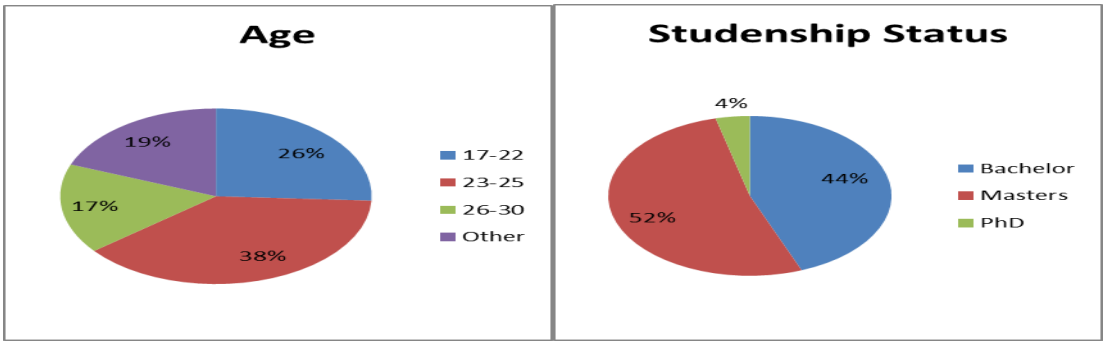
The overall sample consisted of 361 responses from students of different nationality, studentship status, and age. The following graphs depict the demographic data of the sample. As anticipated, the majority of the responses were from the partners' countries of origin (Italy: 161, Portugal: 45, Greece: 44, Turkey: 38), but there was also a considerable number of responses from other countries of the South Eastern Europe such as Serbia, Bulgaria, FYROM, Kosovo, and Romania, mainly due to the involvement of City College in Greece that has students from these areas. Other random responses came from various countries.

Figure 1 Responses per country



In terms of age, the majority of the respondents were mature students over 23 year old, while younger students (17-22) participating in the survey accounted for only 26% of the sample. As the age demographics already indicated, the majority of the students participating in the survey were mature students. Namely, undergraduate students amounted to 44% of the sample, while the majority consisted of master students (52%). There were also a small percentage of PhD students (4%).

Figure 2 Responses per age & studentship status



2.3 Roundtable Discussions

In order to examine quadruple helix stakeholders' perceptions on digital entrepreneurial training needs, roundtable discussions with representatives from academia, business, government, and society were conducted in each participant country (Turkey, Greece, Italy, and Portugal). These roundtable discussions had a coordinator from each partner who guided the discussion based on a semi-structured questionnaire, but the discussion also led to other related issues, as this was the scope of the roundtable discussions. The main questions included in this questionnaire where the following:

- What do you think are the most important managerial, communication and relational, and personal skills in entrepreneurship?
- From those skills, what would you think future entrepreneurs mostly lack?
- Do you think that an on-going collaboration between businesses, academia, government and the society would address those gaps? How?

As table 2 indicates, four roundtable discussions with quadruple helix stakeholders took place, one in each country, with representatives from the local academia, business, government, and society:

Table 2 Roundtable Participants per country

Country	Participants
Turkey	9
Greece	14
Italy	12
Portugal	16
Total	**51**

3. Results

The outcomes of the TNA were various since different research methods examined a variety of issues. These results were however synthesized in order to come up with significant conclusions regarding the design of the entrepreneurship training curriculum. The main results are analyzed in the current section, and the final conclusions are formulated in the conclusions part of this paper.

3.1 Desk based research

As mentioned earlier in the sample description, the desk based research resulted in the concentration of 53 cases from all over the world, involving mainly best practice incubators and accelerators. Through an examination of these organizations' stakeholders involved and the type of service support offered, the study reveals the following.

First of all, these organizations place limited emphasis on active University students. The majority of people applying in these organizations are not University students, but people that have usually graduated and are willing to be trained in starting a business. Therefore, it seems that there is an unaddressed 'grey' area between university studies and training in starting a business, as University studies teach 'entrepreneurship', while Incubators/accelerators train actual 'startups'.

Secondly, incubators and accelerators usually focus on investment-ready ideas and solid teams. That practice excludes people that don't have a ready formulated idea or a team. In other words, 'Startup for starters' training seems to be missing.

Finally, the training provided by these organizations is usually long-term, as it involves weeks or even months of training. As such, people that cannot commit so much time, but still want to learn the basics of startups cannot participate. Thus, the existence of short and intensive training could address the needs of these people.

3.2 Questionnaire Survey (Students)

The main aim of the questionnaire survey on students potentially becoming entrepreneurs was to examine students' perceptions on which skills are important for entrepreneurship, and from those skills, what was their level of familiarity. Regarding **managerial skills,** students

identify Opportunity Recognition and Problem Solving as the most significant managerial skills, while Marketing and Financial Projections are ranked relatively low. Even in the case of skills that they consider necessary however, their level of familiarity is low. A similar trend was identified in the results of **the communicational and relational skills.** Overall, with the exception of Collaboration and Empathy skills where the percentages between the level of significance and the level of familiarity are relatively close, there exists a gap between what respondents think is important and what they actually acquire. The skills that appear to more significant compared to other communicational and relational skills are Team Building and Team Working skills; Networking techniques were ranked second in importance according to respondents but in the same time they were the least ranked in terms of familiarity. A similar trend is identified when examining the results for **Personal skills.** Personal skills seem to be ranked relatively higher than communicational and relational skills by the respondents in terms of necessity for entrepreneurship, but again the comparative scores on level of familiarity are low.

By summarizing all results regardless of the categorization of skills, interesting findings emerge concerning entrepreneurship training needs at least based on students' perspectives. Table 3 ranks all skills included in the questionnaire survey in terms of their necessity for entrepreneurship. The corresponding levels of familiarity are also provided. As the table indicates, students value Opportunity Recognition and Problem Solving highly, while Creative Thinking, Team building and Teamwork are also considered highly important. Nevertheless, the respective levels of familiarity are low; therefore it is clear that there **is a gap between what skills are essential for entrepreneurship and what students actually have**.

Table 3 Summary of all Skills

Skills	Necessary for Entrepreneurship (%)	High Level of Familiarity (%)
Opportunity Recognition	79,2	28,8
Problem Solving	78,9	50,4
Creative Thinking	75,3	46,3
Team building & Teamwork	75,1	57,6
Business Planning	72,6	33,8
Idea Generation	72,6	57,6
Networking Techniques	68,7	33,5
Flexibility	68,4	33,5
Communication/Presentation Techniques	68,1	44,6
Collaboration& Empathy	65,1	57,9
Stress Management & Resilience	63,7	57,9
Financial Projections	59,3	25,2
Marketing	56,8	32,7

3.3 Roundtable Discussion (Stakeholders)

The results of the roundtable discussions that took place in the four cities (Thessaloniki, Izmir, Como, Coimbra) were synthesized and the main outcomes involve: 1. Stakeholders 'suggestions regarding skills, and 2. Stakeholders' suggestions regarding On going Collaboration.

Training Needs

Although a great number of skills were recognized by stakeholders as essential for entrepreneurship, what was really interesting was the identification of the basic skills young entrepreneurs usually lack based on the various stakeholders' experiences. Thus, one major outcome of the roundtable discussions with the stakeholders was their suggestions regarding skills that potential entrepreneurs need to be trained on.

Firstly, according to the stakeholders, due to the gap between an interesting idea and commercial success, future entrepreneurs must be trained on opportunity recognition skills (understand the needs of the market) as well as on market validation skills (effectively communicate an idea to the market, know how to pitch).

Secondly, stakeholders emphasize teamwork and team building as essential skills that usually young entrepreneurs lack. They argue that potential entrepreneurs must realize the importance of skill complementarity in a team context, that they should be able to know oneself (i.e. personal skills, strengths, weaknesses, etc.) in the process of building a team, and that they should be open, share ideas, and show empathy.

Finally, stakeholders argued that potential entrepreneurs should be flexible and resilient. It is essential that they perceive technological and market trends quickly and that they appropriate them into commercial solutions and offerings. It is also essential that they will be trained on alternative scenario development.

Ongoing Collaboration

Regarding stakeholders' input on whether an on-going collaboration between businesses, academia, government, and the society would address those gaps, stakeholders' suggestions are summarized as follows.

One of their suggestions is that academia and the business world should enhance networking practices. This way, they will increase the accessibility of all stakeholders by entrepreneurs. Another key suggestion is that the business world should try to provide the commercial validation to academia. One way for this to happen is having the business word offering issues or problems to be solved by academia. In this case, however, each stakeholder's unique role must be preserved. A final suggestion involved the promotion of entrepreneurial activity by academics, where the availability of research funding for the effective transformation of a research idea to commercial success, was identified as an essential success factor.

4. Conclusions

The majority of current entrepreneurial training is delivered as academic and organizational courses, highly focused startup training in incubators or as generic public sector initiatives. Nevertheless, as the current paper suggests, there is also the need to provide entrepreneurship training to potential entrepreneurs that don't have investment ready ideas or haven't formulated solid teams. And since most training support provided by incubators and accelerators is long term, there is also a need to provide shorter training programmes.

Towards the design of the curricula for such training programs, and given the literature suggestions on the importance of all related stakeholders in the design process, the results of the current TNA may prove to be very beneficial towards that direction. The comparison between students' and all related stakeholders' (academia, business, government, society) perceptions on the potential gaps in entrepreneurship training, gave quite similar results. On the one hand University students identified certain gaps between what skills they believe are important and their personal skill-level. These mainly involved skills such as opportunity

recognition, problem solving, creative thinking, and team building/teamwork. Stakeholders' views were also in accordance with the majority of the findings of the students' survey. They emphasized opportunity recognition skills, team working skills, and personal skills such as flexibility and resilience.

Considering the results of this TNA, a dynamic, bespoke, and pan-European entrepreneurship training curriculum will be developed under the scope of the iStart project, which will address the 'one-size-fits-none' entrepreneurship training process. This training program will leave room for local and tailor-made startup training services. Such a structure is not only entrepreneurial in itself, by allowing creative pivots of the training arrangements, a necessary element of any entrepreneurial practice, but more importantly it is increasingly relevant with our socio-economic conditions and our post-industrial age of doing business.

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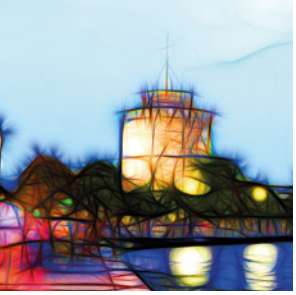

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GENERATORS OF PEOPLE'S ECONOMY IN SUB-SAHARAN AFRICA (SSA) COUNTRIES

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Multinational companies (MNCs) investing in SSA countries could improve the value generated by their activities for themselves and for the targeted countries, if they use the right entry strategy and if the other side will be organized for efficient local cooperation partnerships. We found a wide range of specific projects, which, by using the relevant strategies, could improve the value generated for both sides in energy, agriculture, infrastructure, food processing, cosmetics and health products.

Keywords
Africa, Entry Strategy, Globalization, MNC

1. Introduction

Economic growth benefits to few people in SSA countries. Exports of agricultural products and raw materials benefit to few and increase inequality between the few and the many who receive less and less because they are more and more numerous. More inequality generates a wider informal economy and more poverty.

2. Objective

Peoples' economy means economic development which contribute to the improvement of the economic situation of many. Our objective is to propose generators for people's economy based on common economic interests with MNCs. We present first the global positioning of SSA countries MNC in international trade and FDI flows. Follow entry and cooperation models proposed by researchers and potential generators of economic development which could be supported by MNCs.

3. International trade and FDI

According to the World Bank, GDP growth in Africa was on an average 4.5% in 2014, which is greater than 4.2% GDP in 2013 [1]. It is weaker than the peak average rate of 6.4% during 2002–08. Performance in the three largest economies of the region was different: strong growth in Nigeria, subpar growth in South Africa and a lower growth in Angola.
Crude oil is the main export of Angola, Cameroon, Chad, Republic of Congo, Gabon, Nigeria and Sudan. Extractive industries play a key role in various economies [1]. Iron ore is the top commodity export in Mauritania, copper in the Democratic Republic of Congo (DRC) and Zambia, aluminium in Guinea and tin in Rwanda.

In other countries, agriculture is the most important source of the economy. Coffee is the main commodity export of Burundi and Ethiopia, cocoa in Côte d'Ivoire, Ghana and Togo and cashews in Guinea-Bissau. Western Europe accounted for more than half of all greenfield investment into Africa in 2014, with an estimated $47.6bn invested [2] [3]. France is the main source of investment in Africa with 18.3 billion USD, 18% of the total FDI in 2014, followed by Greece with USD10 billion $ (10 percent), US with 7.9 billion USD (9 percent) and China with 6.1 billion $ (7 percent) (FDI Intelligence, 2015). China is the largest developing country foreign investor in Africa (UNCTAD 2013). China's FDI stock in SSA reached nearly USD 24 billion in 2013, reflecting an annual growth rate of 50 percent between 2004 and 2013 [4] [5]. Chinese FDI are concentrated in Nigeria, South Africa, Sudan, and Zambia. Chinese manufacturing firms have invested also in other countries such as Ethiopia, Nigeria, and Tanzania.

4. Entry and cooperation strategies

A firm globalizing its business activities selects the relevant entry strategy according the level of risk, size of investment and expected returns.

4.1 Entry strategies

Entry strategy options in international markets are as follows: export, licensing-franchising, local distributor, facilities management, joint venture, strategic alliance or direct investment in fully owned subsidiary [6].

Exporting is the lower risk and investment level option. The local importer takes the risk and invests in order to buy, promote and distribute the product or the service.

The licensing-franchising and local distributor or both of it together are options at a higher risk and higher level of investment, but with the bigger potential to increase the market share.

Joint venture, strategic alliance and own subsidiary strategies are at a higher risk and higher level of investment but could insure a stronger position in the market and generate more value in the targeted country. Those last options are preferable for developing countries.

4.2 Cooperation strategies

Local partners could choose between the following cooperation strategies: contract marketing, incubation – open incubator model, cooperative, export consortia and agglomeration [7].Contract Marketing (CM) partnership insures access to supply chains with market and price stability, as well as technical assistance [8] [9] [10]. In return, contracting firms expect delivery of goods in specific quantities, scheduling quality and price. Cotton and tobacco in Mozambique is exported through CM [11]. Incubation model provides direct support to SMEs belonging to a common specialization. Fundación Chile is a nonprofit organization governed jointly by the Chilean government and a large American conglomerate [12]. In 1979, Fundación Chile initiated the Asparagus Cultivation program, encouraging exports to the US and providing technical assistance to farmers. The Open Incubator model [13], organize and activate a multipurpose network between SMEs in order to generate common business activities upstream and downstream of the value chain. A cooperative negotiate, sign and implement business contracts approved by the members. Finnish cooperatives have almost 4 million memberships (the population of Finland is 5.4 million) [14]. The joint turnover exceeded 30 billion euros in 2011. An export consortia is promotes

the goods and services of its members abroad and facilitates the export through joint actions [15]. Strategic alliances involve the development of joint routines and capabilities, the sharing of intellectual and scientific skills, and possibly joint projects [16] [17]. Herewith we present potential generators of development which could benefit to more efficient entry strategy of MNCs and of local cooperation strategy.

5. Generators of People's Economy

Projects fulfilling common economic interests have to generate benefits for MNC's, local jobs and wealthier living conditions for SSA local population. Herewith, based on a wide research, we have selected projects in which common economic interest between both sides could be achieved if the proposed entry and cooperation strategy will be implemented. [18].

5.1 Energy

5.1.1 Local Initiatives of Mini Grids

Local initiatives of min grids provide electricity to the population by developing small units power based on different sources of energy or based on allocation and operation of long term regional concessions connected to the main grid. Those solutions improve the daily life of millions immediately and create business opportunities for many. In Tanzania, over 30 mini-grids are operating in the country [19]. Renewable energy mini-grids are a cost-effective electrification option for an estimated 20% of the population, over 9 million people.

5.1.2 Azuri Technologies

Azuri technologies has developed solar home systems that incorporate a pay-as-you-go controller. This is activated by a code which is obtained by purchasing a scratch card and is then sent by SMS to Azuri [20]. Azuri sells its solar home systems to dealers who install the system, provide after-sales support and sell the scratch cards, which can be physical cards or scratch card numbers bought using a mobile payment system. By 2015, the system is available in 11 African countries.

5.2 Minerals

Africa is one the main producers of platinum, phosphates, manganese, vanadium, cobalt, aluminium and diamonds. Most of the world reserves of those raw materials are in SSA countries. Herewith the potential cooperation between SSA countries and MNCs.

5.2.1 Platinum Group Metals (pgm)

Most of the worldwide supply of platinum and palladium and the associated elements is obtained from mines in four locations [21]. The Bushveld Complex in South Africa, the Stillwater Complex in the U.S.A., the Great Dyke in Zimbabwe, and the Noril'sk/Talnakh

Complexes in Russia [22]. Consumer and industrial products made with pgm, include products such as flat panel monitors, fiber glass, medical tools, computer hard drives, nylon and razors. Platinum, palladium and rhodium play a critical role in autocatalysis and pollution control in the automotive sector.Zimbabwe and South Africa governments and MNCs investors in mining such as Anglo American could join effort in order to establish a strategic alliance able to generate more value for the countries and the investors along the value chain from raw material to components and devices based on pgm.

5.2.2 3TGs (tin, tantalum, tungsten and gold)

3TGs major inputs for smartphones, laptops, aerospace and military components are most significantly sourced from the Democratic Republic of Congo (DRC) and the Great Lakes Region of Africa [23]. These minerals are mined by artisanal and small scale miners whose livelihoods very much depend on these mineral supply chains. They, today, finance DRC's continuous armed conflict and have been labeled 'conflict minerals'.
The Public-Private Alliance for Responsible Minerals Trade (PPA) (reslvo.org website) provides funding to develop conflict-free supply chains. The members of PPA are companies such as Microsoft, Acer, Boeing, Dell, Ford, Toyota, HP, GE and Motorola. Upstream and downstream clustering process with relevant partnerships between MNCs investors and local cooperatives of SMEs cooperatives could improve the added value of the potential cluster and generate wealth to the local population and to numerous SMEs in DRC and neighboring countries.

5.2.3 Cobalt cluster

The growing global market for portable electronic devices and rechargeable batteries is driving the growing demand for the extraction of cobalt, a key component in lithium-ion rechargeable batteries. More than half of the world's total supply of cobalt comes from the Democratic Republic of the Congo (DRC). According to the government's own estimates, 20% of the cobalt currently exported from the DRC comes from artisanal miners in the southern part of the country. The Value Chain starts from Kolwezi miners to transportation and traders in Musompo market, most of them Chinese. In turn, these traders sell the ore on to larger companies in the DRC which process and export it. One of the largest companies at the center of this trade is Congo Dongfang Mining International (CDM). CDM is a 100% owned subsidiary of China-based Zhejiang Huayou Cobalt Company Ltd (Huayou Cobalt). This company sells through intermediaries, cobalt to companies such as Apple Inc., Dell, HP Inc., Huawei, Lenovo (Motorola), LG, Microsoft Corporation, Samsung, Sony and Vodafone, as well as vehicle manufacturers like Daimler AG, Volkswagen and Chinese firm BYD.

6. Agglomerations of SMEs

Agglomerations of small businesses exist in organized and less organized locations in urban and rural areas in SSA countries. They are specialized in fruits and vegetables, food cooking, artisanal works, clothes, metal working, furniture, electric devices or cellulars.

The World Bank team [1] analyzed spontaneous agglomerations in five countries in Sub-Saharan Africa, Cameroon, Ghana, Kenya, Mauritius, and Rwanda and collected quantitative and qualitative data from those agglomerations.A key finding of World Bank research is that agglomeration based on micro and small enterprises are performing better, both in sales performance and ability to reach distant markets than enterprises outside the agglomeration. Those agglomerations could be organized in a professional business network with the support of local and national authorities. Specialized open incubators [13] could support entrepreneurs in a determined agglomeration along the whole value chain or the sector.
Each firm in each agglomeration could belong to the network supported by the management of the open incubator and its experts. Common support activities such as joint purchasing of raw material and joint effort in promoting business opportunities in common.

6.1 Street food in Ghana

The objective of the project was to enhance quality, safety and economics of street-vended foods in Ghana. The project was implemented in two stages, one in November 1999-October 2000 focused on a survey on food vendors [24] (nri.org website) and the second one in February 2003 – January 2003 of which the objective was to develop food safety and business strategies.

6.2 Arusha Furniture - Tanzania

In 2007 JICA conducted a door-to-door census of micro and small workshops in the wooden furniture industry in Arusha, Tanzania, which experienced a wave of new entries in the 2005–07 period [25] (Muto et al, 2009).The owners of workshops tend to locate where the market is large or where customers are expanding. Customers are expanding along the international road, which is connected to the Kenyan road network or along the road that connects Arusha with inland urban centers. Higher performance was observed for workshops that are located where the upstream wood-processing linkage is efficient.

6.3 Suame Magazine Cluster, automobile repair services - Ghana

Located in the Suame area in Kumasi, the second largest city in Ghana and the center of the Ashanti region, Suame Magazine is an agglomeration with approximately 10,000 enterprises and workshops in automobile repair services (garages), automobile parts production, and retail services, as well as metalworking, employing an estimated 100,000 workers [26].Collaboration among specialists is coordinated by generalist mechanics called fitters, who receive orders from car owners, determine the cause of the trouble, decide who should be involved in the repair work and how much they should be paid, and collect and distribute payments by the customers. Fitters organizing the orders, machinery, technology transfer unit, express the will to cooperate and is a positive environment for the creation of specialized open incubators.

7. Strategic alliances

7.1 Mango

The World Bank project, PCDA (Programme Compétitivité et Diversification Agricoles), with funding from the Dutch Embassy, built a modern pack house, The Plaza in Bamako-Mali, near the airport, to help exporters improve their capacities in handling and shipping mangoes [27] . The Plaza has proven to be an effective pack house despite its location, away from the growing region and the border with Côte d'Ivoire. However, the Plaza currently operates only during the mango season.
As part of PCDA, the Dutch firm Bakker Barendrecht teamed with five exporters operating at the Plaza to teach the exporters how to reach European markets with their products.

7.2 Cocoa

Cote d'Ivoire, is the main world producer of cocoa. In 2014/15, 53 commercial companies and 27 cooperatives have been approved and in 2015/16 only 4 commercial companies and 4 cooperatives [28]. Quality has not improved during the last year. Exporters are rejecting roughly half of cocoa port arrivals from top producer Ivory Coast on quality grounds [29]. Ghana the second main producer succeeded/ to modernize its infrastructure and improved the value added of cocoa to the local economy Marketing of Ghana's cocoa beans is the primary objective underpinning the formation of the CMC (Cocoa Marketing Company) [30]. A West African business partnership promoting a common product regional trademark could improve the revenues along the value chain from the growers to the exporters, importers, the manufacturers and provide a higher value to the customers.

7.2 Cotton

Cotton is vital for the survival of many low income countries in SSA countries. It accounts, in value terms, for 26.4 per cent of Benin's exports and 58.7 per cent of Burkina Faso's [31] .Burkina Faso is the first African exported with 1.2 million 480lb bales followed by Mali (1million), Cote d'Ivoire (0.7 million), Benin (0.6 million) and Cameroon (0.5million). As many as 100 million households are directly engaged in cotton production and an estimated 300 million people work in the cotton sector including those who work in ancillary services such as transportation, ginning, baling and storage are taken into account. Almost 80% of cotton fiber is processed into yarn in Asia [32]. In contrast, fiber transformation rates in Africa is only 5% of francophone and 43% of Anglophone African cotton being processed on the continent. On average, 83% of SSA cotton is exported as lint, almost exclusively through international merchants to Asia. A West African business network improving the cotton value chain upstream (growers) and downstream (fiber transformation) could improve their competitive advantage in the global market.

7.3 Shea Nuts

West Africa currently exports between 265,000 and 445,000 tons of shea per year in nut weight equivalent [33] and accounts for 99.8% of total exports of shea.

Ghana is the leading exporter in the region, which exports about 40,000 tons per year [34].The commodity is exported to France, Great Britain, the Netherlands, Denmark, North America and Japan [35].The main outlet for shea is Cocoa Butter Equivalent (CBE) industries. Shea butter has similar chemical and physical properties to cocoa butter but costs less [36]. Shea butter is also used in cosmetics by firms like L'Oreal and L'Occitane, because it is highly concentrated in fatty acids that will melt at body temperature [37]. This means that it will be readily absorbed when applied to the skin. A common organization of cooperatives active in shea production could strengthen their position in negotiations with MNCs specialized in the production of CBE such as AAK (AarhusKarlshamn AB, Sweden, IOI Loders Croklaan, Malaysia, 3F Foods Fats and Fertilizers Ltd., India cosmetics firms such as L'Oreal and L'Occitane).

8. Conclusions

MNCs could be the main generators of development in SSA countries if the SSA side will be able to propose feasible winwin projects in cooperation with local efficient partnerships. The selection of the projects has to be based on a dynamic local or international market and on the capability of the formal and informal business sector to organize efficient partnerships able and ready to cooperate with MNCs. The local consumers in sector such as energy or mobile finance services, could be organized in consumer cooperatives in order to improve the value created by the providers of product or services for the benefit of both sides.

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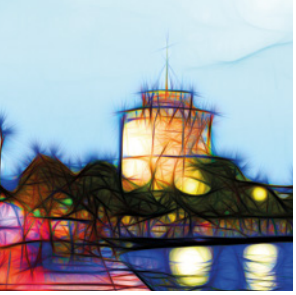

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AFRICAN ENTREPRENEURIAL ACTIVITIES IN TOURISM SECTOR: A CASE OF SMMES IN TSHWANE MUNICIPALITY

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Using Tshwane Municipality as a case, this paper investigates the veracity of assertions made in the MARS model by Marshall, Arrow and Porter on the viability of African entrepreneurial activities in the tourism sector and the extent to which they lead to greater innovation and growth in the tourism industry. Developing countries, perceive tourism as the solution to many socio economic needs. With high unemployment, poverty, wealth inequality in South Africa, African entrepreneurs have resorted to tourism related activities for income generation. The government has played a supportive role in the growth and development of small businesses and entrepreneurship. Quantitative data from a sample size of 311 of African entrepreneurs working in the tourism industry was used. Data variables included: Intense competition from rival businesses and viability, lack of entrepreneurial skills, business networks, geographical location, low capital, and financial collateral, degree of support from Government agencies and age of respondent. Data analysis is then performed by using methods such as cross-tab analysis and Log-linear analysis. Results obtained from log-linear analysis showed that there was a statistically significant association between degree of competition from rival operators and financial viability, thereby corroborating the assertions made in MAR theories and by Porter (1990).

Keywords
African Entrepreneurial activities, Entrepreneurship, Financial Viability, Log-linear analysis, Tourism

1. Introduction

Entrepreneurship is an important force in economic development [1]. South Africa is confronted with numerous political, economic and social challenges. There is growing unemployment rate of 26.7% [2] high levels of poverty, social delivery unrests. It is regarded as one of the most unequal countries with a Gini coefficient of 0.69. The wealthiest 4% of household receive 32% of total income while 66% of household receive only 21% of all income [3]. Over half of South Africans live below the national poverty line and more than 10% in extreme poverty, on less than $ 1.25 (R15.85) per day. With 6.4% of GDP public spending on education, 27% of pupils who have attended school for six years cannot read, 37% go on to pass to matriculation exam and only 4% earn a degree [4].

Current unemployment rates among the youth, high levels of poverty, inadequate and unequal educational system, poor service delivery of the mere basic needs, and unequal distribution of income continue to depict a calamitous situation requiring urgent attention and therefore, a justification of entrepreneurship as a remedy to the current challenges.
Small Medium Enterprises (SMEs) accounts for more than 90% of the total number of formal firms worldwide [5]. In South Africa, the National Small Business Act 102 of 1996, defines "Small, medium and micro enterprises (SMMEs) as a separate and distinct business entity, including cooperative enterprises and non-governmental organisations, managed by one owner or more, which includes branches and carried out in any sector of the economy [6]. It is estimated that 91% of the formal business entities are SMEs contributing between 52 to 57% to GDP and provides about 61% of employment [7]). Hence, the role of SMMEs in South Africa is earmarked as a possible solution to its socio economic problems.
The rest of the paper discusses the review small businesses in the tourism sector in section two. Section three discusses the theoretical framework. Section four discusses the methodology. Section five presents the results for the data analysis and discussion of the significant results. Section six concludes the paper.

2. Literature Review

2.1 Tourism sector in South Africa

Tourism is echoed in various studies as fast growing with enormous contributions to economic growth and poverty alleviation. The direct contribution of Travel and Tourism to GDP was ZAR113.4bn (3.0% of total GDP) in 2014, forecasted to rise by 3.8% in 2015 and to rise by 4.6% pa, from 2015 - 2025 [8]. Studies conducted on the active participation of the African population agree that in most countries, economic policy makes provision for the attainment of a high level of entrepreneurial activity and a dynamic sector of small business.
Entrepreneurship is associated with far-reaching expectations relating to economic and social well-being [9]. The ownership of well-established tourism enterprises was, and still is, dominated by a majority of white entrepreneurs in South Africa. Market access, capital, marketing and networking skills, among emerging African entrepreneurs still lag behind. Although political transformation in South Africa was geared to change the racially defined industry and increase participation of previously disadvantaged, very little has changed. Post-apartheid planning and legislation envisaged that political transformation would coincide with economic transformation. That black people would participate fully in the tourism industry both as tourists in their own country and as entrepreneurs [10]. Tourism within these facets harnesses the establishment of new enterprises, creates new jobs and reduces unemployment. It stimulates competition, efficiency and innovation, and contributes to economic growth and prosperity.
The review of literature on tourism, entrepreneurship and small business on both the international scenes and in South Africa is vast. Several scholars discuss tourism, its impact, benefits to the economy, the constraints facing tourism entrepreneurs [11]; [12]. Studies conducted by researchers such as [14]; [15] and [16] clarified the prospects of entrepreneurship in the tourism sector. The authors identified and quantified factors that affect the viability of informal microenterprises in the tourism sector of the economy. In

transitional economies like South Africa, numerous challenges and obstacles are related to economic policy, capacity, skills and access to market. There is evidence of unequal distribution of wealth between white and black entrepreneurs, high unemployment rate among the youth, lack of entrepreneurial and technical skills that are required for operating profitable businesses, lack of access to finance, and massive poverty among the masses.
Small enterprises have a greater impact on economic performance in highly developed economies where high levels of education, low inflation rates and high level of financial intermediary development are evident [17]. SMMEs are positive contributors of innovation, facilitating change and enhancing competition [18] The estimated 91% of the formal business entities in South Africa that are SMEs contribute 52 – 57% to GDP and employs about 61% of the total labour force [7]. It can rightly be argued that small tourism enterprises have the ability to spur economic growth. The tourism sector is not a self-contained industry, but rather it relates with other sectors like agriculture, mining, transport and others in order to satisfy the consumer.
Tourism offers a potential to galvanize local agricultural development through backward linkages that allow local farmers to supply the food needs of tourism establishments. Linkages between agriculture and tourism are central to promoting symbiosis rather than conflict between the two sectors [19].
On the contrary, [14] postulates the need for an investment of 39% as a proportion of GDP to reach the 7% growth target and reduce greatly unemployment. Studies in Australia and the UK, revealed that between 95% and 99% respectively of all tourism businesses were found to be small enterprises which included guest houses, bed and breakfast establishments, travel agents and ground operators amongst others [20].
Economic objectives of increased earnings, foreign exchange, investment, job opportunities, as well as the minimization of diverse social and cultural effects, might best be accomplished through the promotion of small tourism businesses rather than large tourism businesses [21]. Tourism sector is expected to become one of the key drivers of economic expansion, local development and job opportunities in developing countries [22]. Despite such claims and the importance of SMME development in the modern South African economy, limited research has been undertaken on the business orientations influencing the performance of small tourism enterprises.

2.2 Entrepreneurship and Small Businesses in South Africa

Entrepreneurship is characterised by creativity, innovation and resource gathering [23]. Value creation through a new venture is common in most explanations [24]; [25]. From the review of entrepreneurship literature, it is evident that there is no standard accepted definition of the concept [24]; [25]. Entrepreneurship is defined as a process of conceptualizing, organizing, nurturing and launching through innovation a potential high growth venture in a turbulent market [24].
Entrepreneurship and the development of small businesses are of critical importance to the growth of the economy. These concepts both need entrepreneurial stimuli for start-ups, but the small business tends to stabilize at a certain growth stage and only grow with inflation [25]; [45]. Typically, small businesses (non-entrepreneurial) appear not to be driven by a growth orientation objective [25]; [26], but operate with established products in existing markets.

Creativity and innovation are the key attributes that distinguish entrepreneurs from small business owners. An entrepreneurial enterprise whether large or small, is predominantly differentiated by the enterprise strategic and innovative practices. [27]; [28].
Furthermore, small businesses (traditional) lack the entrepreneurial orientation posture which is a crucial element to sustaining the business in turbulent markets [24]. In addition, most of the policies and support programs are directed towards small businesses and not entrepreneurial small firms. As such failure by governments to redirect their policies to small entrepreneurial firms has not only hindered the entrepreneurial endeavour and enthusiasm, but halted these firms in their ability to stimulate economic growth.
Small firms encounter several drawbacks that affect their performance and these include among others, inadequate financial resources, stringent government regulations and the potential for poor management. Studies indicate that a high percentage of SMMEs fail within the first two years of establishment [29]; [30].

2.3 Efforts to transform South Africa's Tourism Industry

Meaningful transformation of the South African tourism industry must lead to economic empowerment and direct benefit to the previously neglected communities coupled with involvement in decision making structures. Areas that require transformation to enable South Africa's tourism industry to benefit previously disadvantaged communities are ownership and control of the tourism industry, distribution of benefits accruing from tourism growth and local communities' lack of knowledge about the industry. [10].
The need for socio-economic equality and equity arose from four concerns namely: moral imperative, to make right the wrongs of the past, the social imperative, conceding that the wealth of the country is a social problem, the economic growth imperative which has been fuelled by the poverty levels in the country and unemployment rate between 35% and 40% and finally the labour skills imperative, which seeks to increase the skills levels of black labour and generate value-added activities within the economy [31]. BEE is therefore a central feature under these circumstances and the role of developmental local government is given particular attention as a key role player in the implementation of BBBEE [31].
Policy formulation is easier to achieve than policy implementation and evaluation. Policy implementation requires resources and mechanisms to monitor and enforce compliance. Despite the determination of the post-apartheid governments to push back the frontiers of poverty through strategic policy interventions, there has not been clarity or any significant progress [10].
Transformation in South Africa is still relatively limited in depth, and has many gaps (including B-BBEE dealings, the challenges and the factors necessary for success) [32]. [33] have noted with concern the apparent lack of progress BEE has made in rectifying the legacies of apartheid because "ten years later many of the challenges remain or have become even more acute in terms of poverty, unemployment, housing and basic services, inequality, HIV/AIDS". [34] also observes that "the BEE program has achieved little success in eradicating poverty, increasing employment or fostering economic growth".
Despite the wide array of topics covered in the transformation debate, and notwithstanding the criticisms levelled at BEE, it may be argued that little research has actually been done on the more 'practical issues' related to BEE compliance, such as the potential impact it may have on the various dimensions of business performance [34].

3. Theoretical Framework

The MAR theory knowledge spillovers by Marshal, Arrow and Romer postulates, that the proximity of firms within a common industry often affects how well knowledge travels among firms to facilitate innovation and growth [35]. The closer the firms are to one another, the greater the MAR spill over. The exchange of ideas which eventually leads to innovation, is largely from employee to employee, from different firms in some industry exchange ideas about new products and new ways to produce goods.

Porter, like Marshall, Arrow and Romer, argues that knowledge spill overs in specialized, geographically concentrated industries stimulate growth. Local competition, as opposed to local monopoly, fosters the pursuit and rapid adoption of innovation [36].
Under the Jacob's spillover view, the proximity of firms from different industries affect how well knowledge travels among firms to facilitate innovation and growth. This is in contrast to MAR spill overs, which focus on firms in a common industry [35]. The diverse proximity of a Jacobs's spill over brings together ideas among individuals with different perspectives to encourage an exchange of ideas and foster innovation in an industrially diverse environment.
The veracity of assertions made in MAR models, Marshall, Arrow, Romer and Porter theory suggest that competition among tourism operators leads to greater innovation and growth in the industry [37]. MAR model argues that local monopoly among firms in the same sector in the same geographical area enhances distribution of knowledge resulting into innovation and growth. The MAR model believe that local monopoly is better than local competition. Porter argues that specialization of a specific activity in a specific region boost diffusion of knowledge but differs with local competition [36]. He further argues that local competition allows innovation and consequently growth in the region.

4. Methodology

The approach used in this study is limited to a case study in which all data collected is gathered from African entrepreneurial tourism related activities in the Tshwane Municipality, Gauteng Province. With the application of both quantitative and qualitative methods, the researcher utilizes the cross-sectional and descriptive research design. The significant findings in this paper are derived from quantitative methods. Quantitatively, participants' responses were represented in statistical form. Information was reported in the form of descriptive statistics such as means, and standard deviation. The study involved "the steps, procedures and strategies" that were employed to collect and analyze data [38]. The researcher focused on bracketing before going to the research field.
A stratified sample [39] of 311 participants from different socio and economic settings namely: accommodation, tour and travel companies, art and craft, catering and other business establishments was used. A total number of 272 African entrepreneurs, 30 local community participants and 9 government and provincial officials were selected. Three instruments were used in this study: 1- face-to-face interviews - questionnaires [40]. Interviewers were guided by interview and schedules with open-ended questions. The questionnaire consisted of two sections: open-ended questions section and a five-point Likert scale section. Both the interview schedules and the questionnaire were validated by three independent research

experts (pilot). The validity of the questionnaire of study was ascertained by conducting pre-testing and face validity [39]. By using unstructured observation, the researcher was not restricted on what to see and record while collecting data in the field. Observation enabled the researcher to gather actual data from real situations. Any important aspects on the impacts of tourism observed during the study were immediately recorded in field data and a note book to minimize the possibility of forgetting certain details.
The specific analytical approach was rooted in the conceptual and theoretical framework of the study. The statistical methods used in the study for data analyses were appropriate for providing adequate answers to each of the key research questions of study. This segment discussed the study design, the sample size of study, the sampling techniques used for the selection of respondents, and data collection instruments as well as the procedures followed for ensuring the validity and reliability of tools used for data collection.

5. Results from Data Analysis

The results reported in this paper were based on quantitative methods and were obtained from frequency tables, cross tabulation and factor analysis. In this study, the dependent (outcome) variable was viability (Yes if business is viable, No business is not viable). According to [41], businesses that are profitable enough to employ staff on a permanent basis are deemed viable, whereas businesses that do not have capacity for employing staff on a permanent basis are deemed not viable [41]. This criterion was used for defining values of the dependent variable of study.

Table 1 Viability of tourism businesses

Viability of tourism business	Freq	%	Cumulative %
Not Viable	245	78.78	78.78
Viable	66	21.22	100
Total	311	100	

The results in the table 1 above, confirmed that out of 311 tourism businesses, only 66(21.2%) were considered to be viable whereas the remaining 245(78.7%) were regarded as not viable tourism businesses.

5.1 Results obtained from cross- tab-analysis

Data analysis was performed by using Pearson's chi-square tests of associations in order to identify factors that were significantly associated with viability [42]. The results showed that viability was significantly associated with 8 factors at the 1% level of significance.
At the 1% level of significance, significant two-way associations are characterized by large observed chi-square values and P-values that are smaller than 0.01. It is evident from the

Table 2. Below that all 8 factors shown are significantly associated with viability at the 1% level of significance. At the 1% of significance, significant two-way associations are characterized by large chi-square values and P-values that are lesser than 0.01. The table 2 confirms the all the 8 factors have got a P-value of 0.000.

Table 2 Results obtained from cross-tab analysis

Factors significantly associated with viability	**Observed chi-square value**	**P-value**
Intense competition from rival businesses	89.35	0.0000
Poor networking ability	78.36	0.0000
Lack of entrepreneurial skills	74.55	0.0000
Low capital	69.03	0.0000
Difficulty in securing finance needed for operation	59.66	0.0000
Geographical location	52.97	0.0000
Lack of support from Government	50.08	0.0000
Age of respondent	49.23	0.0000

5.2 Results obtained from log-linear analysis

Data analysis was performed by using log-linear analysis [43] in order to identify key predictor variables that were significantly associated with each other. Log-linear models are hierarchical in nature. In general, there could be an interaction of order k. At k successive steps, interactions of order k (the highest order), k-1, k-2… 3, 2 and 1 (the main effects) are tested for significance step by step. The most useful order is k=2.

Table 3 Results obtained from log-linear analysis

Interactions of order k=2	**P-value**
Intense competition from rival operators and viability	0.0000
Lack of entrepreneurial skills and poor networking ability	0.0000
Geographical location and low capital	0.0000

The above results were tested on interactions of order k=2 mainly: variables on intense competition from rival operators and viability; lack of entrepreneurial skills and poor networking; geographical location and low capital and all the tests were found to be with a P-value of 0.000 and therefore very significant.

Discussion of results

The degree of competition from rival tourism operators and financial viability is high between African local entrepreneurs and White/international entrepreneurs (Rival tourism operators. The results revealed that Local black entrepreneurs unlike their white counterparts do not have the financial ability to influence tourism activities. The results show an observed chi square value of 89.35 and P-value of 0.000. These results emphasize the huge gap in the competition between local black entrepreneurs and rival competitors.

These findings are in agreement with the assertions of the MAR model that argues that local monopoly among firms in the same sector in the same geographical area enhances distribution of knowledge resulting into innovation and growth. The MAR model believe that local monopoly is better than local competition.

According to the analysis, the variable on poor networking ability had an observed chi-square value of 78.36 and P-value of 0.000. This variable emphasizes that as compared to rival businesses, local black entrepreneurs had poor networks in the tourism sector. It was evident from the literature reviewed that the majority of local black entrepreneurial firms were not known and lacked proper marketing strategies in the township areas and abroad. Some of the well-established enterprises not only import skilled expatriates from first world countries like Europe and America but also have information centres abroad that constantly market South African destinations. Local black entrepreneurs not only lack the internal and external business networks as compared to rival tourism operators but also the knowledge on tourism and hospitality.

The level of entrepreneurship skills among local black entrepreneurs is alarming. These results show an observed chi-square value of 74.55 and P-value of 0.000. An entrepreneur is an individual willing to take calculated risk to explore a market need with an idea that is sound and economically viable [44]. The level of entrepreneurial skills applied in the business is based on the number of operational elements of entrepreneurship such as compiling a business plan, an analysis of competitors, venturing into new businesses and willingness to take calculated risks.

Securing finance in this regard is pivotal. The results from the analysis show an observed chi-square value of 59.66 and P-value of 0.000. These results show that difficulty in securing finance needed for operation is critical. The majority of local black entrepreneurs struggle to access finance for their businesses.

Financial institutions regard tourism as a high-risk business. They see it as a volatile industry which may be affected by factors beyond anyone's direct control such as floods, crime, the outbreak of diseases, a bomb going off thousands of kilometres away, and even oil spillages. The reluctance of the private sector to invest in tourism is particularly obvious in the rural areas as these are perceived as being out of the way [45].

Massive private sector investment in the tourism industry perpetuates the status quo of leakages and few linkages with the local communities. For instance, the revenue generated from the local area will still be invested outside the area. Although the involvement of the private sector in a tourism development project assures all stakeholders of quality and acceptable standards, particularly in situations where there is massive private sector investment, there are questionable standards for responsible tourism, especially with regard to meaningful participation and benefit for the local communities.

The creation of world standard attractive tourism destinations in the rural geographical locations of Tshwane municipality require a lot of financial capital to set up acceptable infrastructure permissible to international tourists as well as the domestic tourists within South

Africa. The results show that this variable was very significant with an observed chi square value of 52.97 and a P-value of 0.000. Ultimately, local black entrepreneurs would need a lot of financial and business support to provide the expected tourism products that are befitting for world standards.

As a relatively new democracy, the government has an obligation to channel a lot of resources to redressing past ills. The results show an observed chi square value of 50.08 on lack of support from government and P-value of 0.000. This variable is critical for the success of local black entrepreneurs especially during their entrance in the tourism sector. The literature shows sufficient intervention especially in South Africa but upon evaluation, this support does not seem to trickle down to the emerging entrepreneurs.

6. Conclusion

The study confirms that the degree of competition from rival tourism operators and financial viability is high compared to the African local entrepreneurs. Local black entrepreneurs do not have the financial ability to influence tourism activities. There is agreement in the literature that the ability to raise finances is one of the greatest challenges facing small business owners in South Africa. The access to finance is a major problem for South African entrepreneurs. In addition, the study confirms poor networking ability, inadequate entrepreneurship capacity, geographical locations and sufficient awareness of government support as major hindrances to local black entrepreneurs as compared to their rival competitors.

The study corroborates the assertions of the MAR model as true, that local monopoly among firms in the same sector in the same geographical area enhances distribution of knowledge resulting into innovation and growth. The MAR model believe that local monopoly is better than local competition.

Practical Implications

Our main aim in this study was to test the veracity of assertions made in the MARS model on the viability of African entrepreneurial activities in the tourism sector and the extent to which they lead to greater innovation and growth in the tourism industry. This study is especially timely at a time when socio economic issues such as poverty, unemployment, wealth inequality are prevalent in South Africa. Accordingly, the key findings in the study point to the fact that majority of African entrepreneurial activities are not viable. Factors affecting African entrepreneurs included among others intense competition from rival businesses, poor networking abilities, inadequate entrepreneurial skills, low capital, difficulty securing finance and geographical location of local businesses.

The implications of the study derived from the aforementioned findings, point to a specific set of needed capabilities, business strategies, attitudes and information resources that may distinguish both emerging and existing African entrepreneurs into running financially viable and sustainable tourism businesses. The tourism sector is currently controlled by constantly ever changing consumer preferences, changing macroeconomic environment. The crux of it all is that competition is high, there is demand for unique and high quality tourism products and experiences, business have to constantly innovate to improve product quality and also be profitable. As a result, emerging and already existing African entrepreneurial businesses find

such business environment burdensome. These businesses struggle to cope with the market forces of demand and supply and eventually majority of them collapse. Our findings therefore suggest a well-tailored SMME development programmes that provides well-tailored business support services such as funding, training, mentorship, networking in domestic and international markets, and aftercare support that meets the needs of these entrepreneurs. While there is no doubt of government support towards SMMEs, the actual implementation of the policies and awareness thereof among African entrepreneurs remains a deterring factor. Finally, this study upholds the assertions of the MARS model as local monopoly among firms in the same sector in the same geographical area enhances distribution of knowledge resulting into innovation and growth

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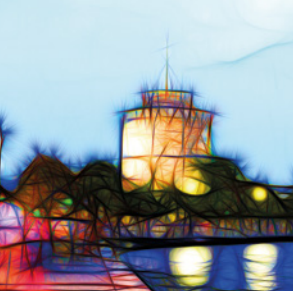

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COMPETITIVENESS AND CSR IN SME: RESULTS FROM A STUDY IN THE MADRID REGION

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The object of this study is to evaluate the impact of certain practices regarding CSR put in place by a sample of 95 small and medium enterprises (SMEs) in the competitiveness of these companies. The study was developed in close cooperation with the Chamber of Commerce of Madrid. A PLS structural equation model has been used. The results point out that both management related CSR practices and HHRR related CSR practices has a positive effect on the competitiveness of the companies, reflected in the company's ability to attract and retain talent and on the company's customer orientation. From the selected indicators, the presence of a Code of Conduct is the most prominent one, followed by the existence of procedures to prevent questionable/irregular practices. Limitations for the study are also discussed and some future research lines appointed.

Keywords
Competitiveness, CSR, Ethical organization, PLS, SME

1 Introduction

The object of this study is to evaluate the impact of certain practices regarding CSR put in place by a sample of small and medium enterprises (SMEs) in the competitiveness of these companies. This study was developed with the support of the Chamber of Commerce of Madrid, interested in assessing the direct and indirect effect of different formative and informative sessions, workshops and initiatives carried out in relation to aspects of Corporate Social responsibility (CSR), human resources (HR) and business management (Management).
Several authors have examined the special characteristics of the SMEs, in relation to the research of business ethics [1] and the perception of these companies about Ethics and CSR [2] [3] [4]. The study of ethical and social responsibility in small and medium-sized enterprises, is an area that requires further research [5] [6] [7]. Recently, some studies have been conducted to assess the elements which may have influence in establishing an ethical infrastructure in SMEs [8]. Small and medium-sized enterprises have positive characteristics that would enable them to take advantage of the opportunities of CSR [9], and are better at implementing activities of CSR at the internal level, although it is more difficult to communicate these activities externally [10] [11].
There is a growing interest in establishing a relationship between CSR and the performance of companies [12] [13] [14] [15]. It seems that CSR and ethical responsibility may contribute to the competitive success of the SME, and may be a differentiating factor [16] [17]. Therefore, it is relevant to investigate about these topics, especially when there are no relevant studies on this aspect in relation to companies in the region of Madrid.
This study has an exploratory purpose, and a questionnaire has been elaborated, to gather the presence of some practices carried out by companies and to assess their influence on a construct of competitiveness [18]. For the data analysis, PLS (Partial Least Squares) structural

equations have been chosen, which have already been used in several studies of similar topics [19] [20].

2 Methods

As indicated above, to carry out this study we have opted for questionnaires and techniques of quantitative analysis based on PLS (Partial Least Squares). PLS is a specific structural equation model, that allows to relate variables, which are difficult to measure directly, through a number of indicators [21]. The versatility of structural equations models has made that its use has spread among Social Sciences [22] [23]. PLS analysis is appropriate if we aim to explore relationships that do not have a prior theoretical ground and when the data set is small [23] [24]. It is also a recommended alternative, when there are formative constructs as part of the structural model [23].

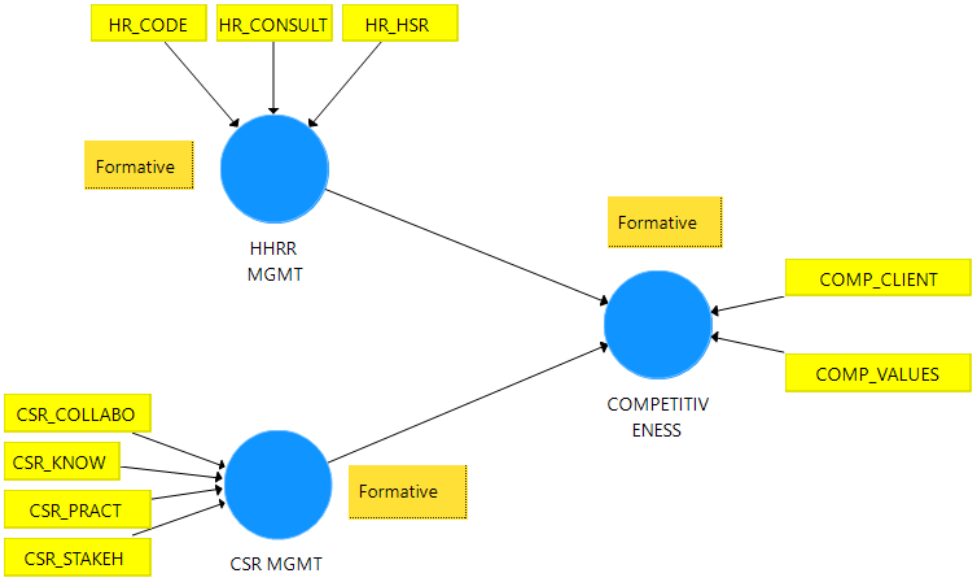

Figure 1 PLS Model used in the study. Developed by author.

The different latent variables or constructs, used in the model are the following:

- Management related CSR practices (MGMT CSR). This is a formative construct that contains aspects such as whether the company knows the meaning and scope of CSR (CSR_KNOW), understands what and who are the groups of interests (CSR_STAKE), collaborates with other entities in the field of CSR (CSR_COLLABO) or have procedures (written or not) by which questionable practices for obtaining commercial advantages (for example, bonuses to key staff on a client or a supplier, etc.) are banned (CSR_PRACT).
- Human Resources related CSR practices (CSR_HHRR). This is a formative construct that contains aspects such as whether the company has a set of rules of conduct and behaviour for employees and partners (CSR_CODE), the company consults with employees on important issues (HR_CONSULT), and how is the company's performance in relation to the conditions of occupational safety and health at work (HR_HSR).
- COMPETITIVENESS. This is a simple formative construct, in relation to two main issues on how competitive a company is. On the one hand, if the company uses their CSR and ethical values, as a tool of motivation for employees and potential candidates, thus reflecting the company's ability to attract and retain talent (COMP_VALUES), and on the

other hand, if they have clear procedures for managing the requests of customers, complaints, and claims, which reflects the company's customer orientation (COMP_CLIENT).

Two main hypothesis are proposed:

- H1. Management related CSR practices, have influence on the competitiveness of the company, seen from the point of view of the orientation to the customer and the attraction and retention of talent.
- H2. Human Resources related CSR practices, have influence on the competitiveness of the company, seen from the point of view of the orientation to the customer and the attraction and retention of talent.

The questionnaire was inspired by different models and existing self-assessment tools (refer to Annex I for the complete list of diagnostics and questionnaires that were consulted). The questionnaire aimed to identify different practices carried out by the companies in relation to aspects of Ethics and CSR, as well as to explore the possible impact of some of these practices on the competitiveness of the company. To validate the content of the questionnaire, it was developed and distributed within the Group of researchers, during the months of May to September 2013.

The questionnaire included several additional aspects, whose treatment and scope are beyond the target of this paper, as for example questions related to contact with ethics and CSR, demographic data of companies and other aspects related to business management, human resources, and the environment.

The questionnaire was sent to 1630 companies from various sectors, which had participated in informative or formative sessions organized by the Chamber of Commerce of Madrid. To facilitate the administration of the questionnaire, it was programmed on an online platform, and access to the questionnaire was sent via email. Data collection took place during the first quarter of 2014 (13 January to March 30, 2014).

Out of the 129 companies that began the questionnaire, a total of 115 companies completed it, i.e., a 7.05% of the total of 1630 the sample.

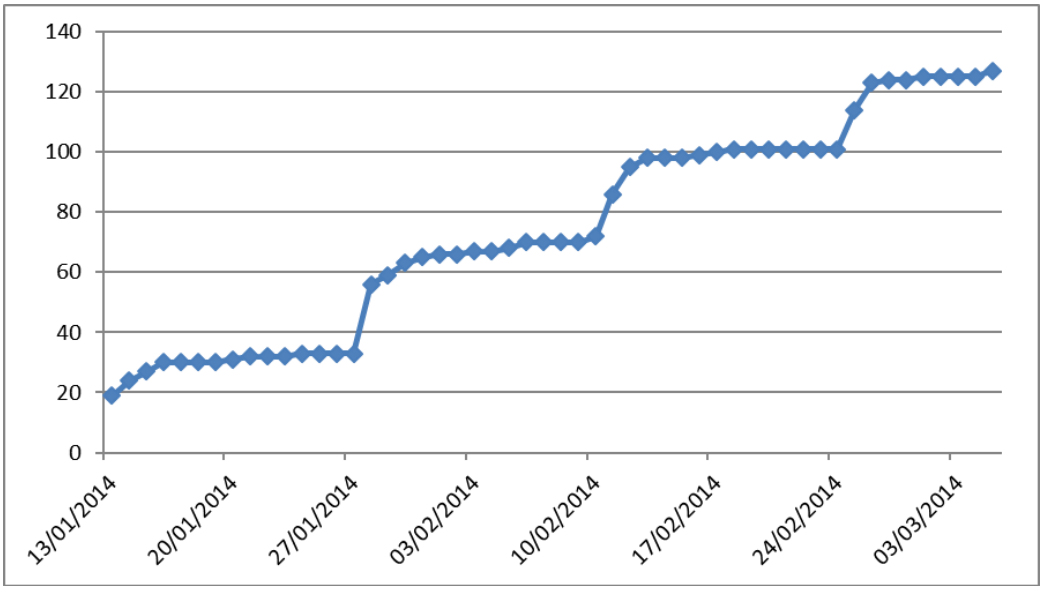

Figure 2 Number of completed questionnaires. Developed by author.

From the completed questionnaires, 20 had to be removed since they corresponded to bug corporations, so the resulting number of valid cases was 95 companies.
To validate the required sample size, the G*Power program has been used, which performs a power analysis and is recommended in cases of small samples [25] [26]. Considering a medium effect, a priori power analysis is done, that is, to calculate the degree of probability of rejecting a null hypothesis when it is false, obtaining the results of Figure 3. For a power of 0.80 (80% probability of rejecting a null hypothesis when it is false) the number of cases should be above 85. In this work, we have used 95 valid cases.

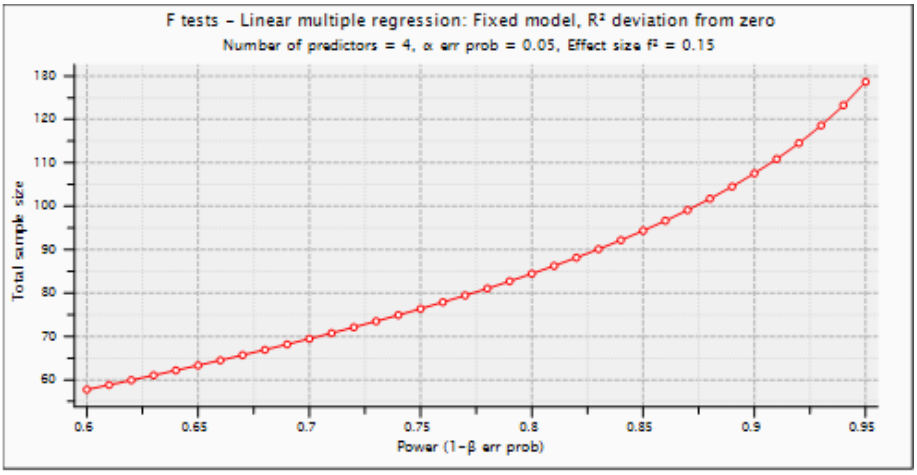

Figure 2. Power analysis plot. Developed by author.

With regards to the quality criteria, full confidentiality and anonymity were guaranteed to the respondents, and therefore the social desirability bias associated with this kind of self-questionnaires should be reduced. In the same way, we attempted to reduce the ambiguity of the questions, by doing a previous review, as noted above.

3 Results

Since global measures of goodness of fit do not apply to PLS, Chin [22] proposed a series of non-parametric criteria for validating partial structural models. The application of these criteria requires a process in two stages [27]. The first step is to check the validity and reliability of the measuring instrument (external model), i.e. the indicators that make up the constructs, and the second phase is the evaluation of the structural relationships between constructs (internal model).
In the case of formative constructs, possible problems of collinearity must be [23]. A high collinearity increases the standard errors of the estimates. Tolerance (TOL) index must be greater than 0.20, or what is the same, the VIF (Variance Inflation Factor, the inverse of the Tolerance) should be less than 5. This condition is met, as it is shown in the following table:

Table 1. Collinearity results for the formative constructs. Developed by author.

VIF					
COMP_CLIENT	1.045	CSR_COLLABO	1.320	HR_CODE	1.113
COMP_VALUES	1.045	CSR_KNOW	1.340	HR_CONSULT	1.072
		CSR_PRACT	1.229	HR_HSR	1.044
		CSR_STAKEH	1.341		

In the following table, the weights for each indicator are included and represent an estimate of their relative contribution to the different constructs

Table 2 Overview of the constructs validity. Indicators sorted by weight and significance.

Construct	Indicator	Loading	Weight	T Value	CA	CR	AVE
CSR MGMT	CSR_PRACT		0.593***	3.377	N/A	N/A	N/A
	CSR_KNOW		0.300	1.960			
	CSR_STAKEH		0.290	1.582			
	CSR_COLLABO		0.191	1.153			
CSR HR	HR_CODE		0.740***	6.717	N/A	N/A	N/A
	HR_CONSULT		0.335**	2.467			
	HR_HSR		0.318**	2.531			
COMPETITIVENESS	COMP_CLIENT		0.644***	6.126	N/A	N/A	N/A
	COMP_VALUES		0.643***	6.291			

Note: CA=Cronbach Alpha; CR=Compound Reliability; AVE=Average variance; N/A = Not applicable
*** p<0.01; ** p<0,05; *p<0,10. Source: developed by author

Once the assessment of the validity of the measuring instruments is complete, we proceed to the evaluation of the structural model, which uses the variance of the dependent latent variables, explained by the constructs that predict them (R^2) and the significance of the structural relations (bootstrapping). We also evaluate the predictive significance through the Q^2 criterion of Stone-Geisser established using a blindfolding procedure for calculating the redundancy of cross-validation [27] [28].

Table 3 Contrast of hypothesis**.**

Hypothesis	Standardized Beta	T Value (Bootstrap)
H1: CSR MGMT -> COMPETITIVENESS	0.374***	3.532
H2: HHRR MGMT -> COMPETITIVENESS	0.418***	4.001

*** p<0.01; ** p<0,05; *p<0,10
R^2 (COMPETITIVENESS) =0.487. Q^2 (COMPETITIVENESS) = 0.247 Source: developed by author

Annex II includes a graphic summary of the complete PLS model with indication of the resulting values.
Finally, an analysis of Importance-Performance has been made with the relations of the model PLS [28]. This analysis allows for the identification of areas for improvement in which to act from the point of view of the managers of enterprises [29]. The analysis uses estimates of the PLS model structural relationships (importance) and adds an extra dimension to the analysis that incorporates the values of latent variables (performance). For an endogenous latent variable in

particular, this analysis provides a map of priorities that would allow to carry out actions in relation to areas that have a high relative importance and relative performance.

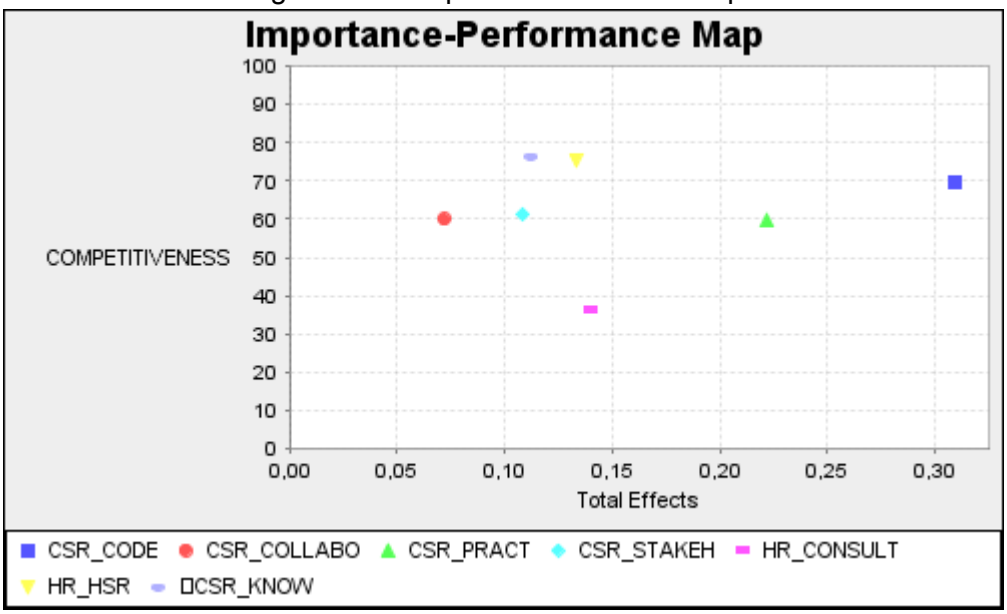

Figure 3 Extended Importance-Performance Map. Source: developed by author.

4 Conclusions

This project, carried out for more than one year, from May 2013 until June 2014, has served to learn about CSR practices in relation to aspects of management and human resources, carried out by the SMEs of the community of Madrid.

A PLS structural equations model has been established to assess the influence of such practices of CSR in the competitiveness of the company, comprising two main aspects: ability to attract or retain talent, and orientation to the client. Thus, a quantitative study with 95 valid questionnaires from companies, all of them SMEs, was developed, with the participation of the Chamber of Commerce of Madrid.

Both Management related and HHRR related CSR practices, have positive influence on competitiveness, so that the two proposed hypotheses are contrasted affirmatively.

The existence of a code of conduct is the individual aspect that has more influence, followed by the existence of procedures, written or not, to prevent questionable practices.

The results obtained may be valid from a descriptive point view. However, the limited number of data and the absence of a control group, does not allow the generalizability of the results. Therefore, a possible line of future research would be to expand the sample to companies from other regions, to thus reach more accurate statistical results.

Not all the elements that may contribute to the competitiveness of the company were including in the questionnaire, nor all practices in relation to CSR, due to constraints in the number of questions. Similar studies with other samples of companies and with the inclusion of other topics could also be considered as future lines of research.

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ANNEX I – Some questionnaires and tools used as reference in the elaboration of the questionnaire.

1. Corporate social responsibility for SMEs Guide www.guiarscPYMEs.org
2. Self-diagnostic RSE PYME of CECOT www.cecot.es
3. RSCAT self-diagnosis questionnaire. CSR program. PIME. Social responsibility Questionari - phase of diagnosis. Generalitat de Catalunya. Model indicators of CSR for SMEs rscat.gencat.cat
4. Instrument of self-diagnosis for companies, proposed by the FECHAC (Chihuahuan entrepreneurship Foundation, BC). www.fechac.org/pdf/instrumento_de_autodiagnostico_de_rse_para_las_empresas.pdf
5. Guide to effective communication. European Commission. Directorate-General for enterprise. www.ec.europa.eu/enterprise/policies/sustainable-business/index_en.htm
6. Introduction to the corporate social responsibility for SMEs. European Commission. Directorate-General for enterprise. www.ec.europa.eu/enterprise/policies/sustainable-business/index_en.htm
7. Responsible companies. Awareness questionnaire. European Commission. Directorate-General for enterprise. www.ec.europa.eu/enterprise/policies/sustainable-business/index_en.htm
8. Guide to improvement and the implementation of Corporate Social responsibility in SMEs. Chamber of Commerce of Madrid. www.camaramadrid.es
9. Guide to ethical management in SMEs. Confecamaras. Colombia www.probidad.org.co
10. CSR for SMEs implementation guide. Association of Christian entrepreneurs (ADEC). Paraguay. www.adec.org.py
11. Guide for the implementation of the RC in SMEs. Sustainability Excellence Club. PWC. www.responsabilidadimas.org/download/nuevaguiaPYME.pdf
12. Guide to Corporate Social responsibility for SMEs. Corporate Social responsibility Observatory. www.fundibeq.org
13. Workbooks in CSR for SMEs. The previous diagnosis. www.camaravalencia.com
14. Self-diagnostic CSR SME. Foundation wing. www.fundacionalares.es/
15. Self-evaluation manual and form of self-assessment in CSR proposed by leaders in Uruguay. www.Deres.org.uy
16. The IARSE CSR indicators. Argentina. www.iarse.org

ANNEX II –PLS MODEL

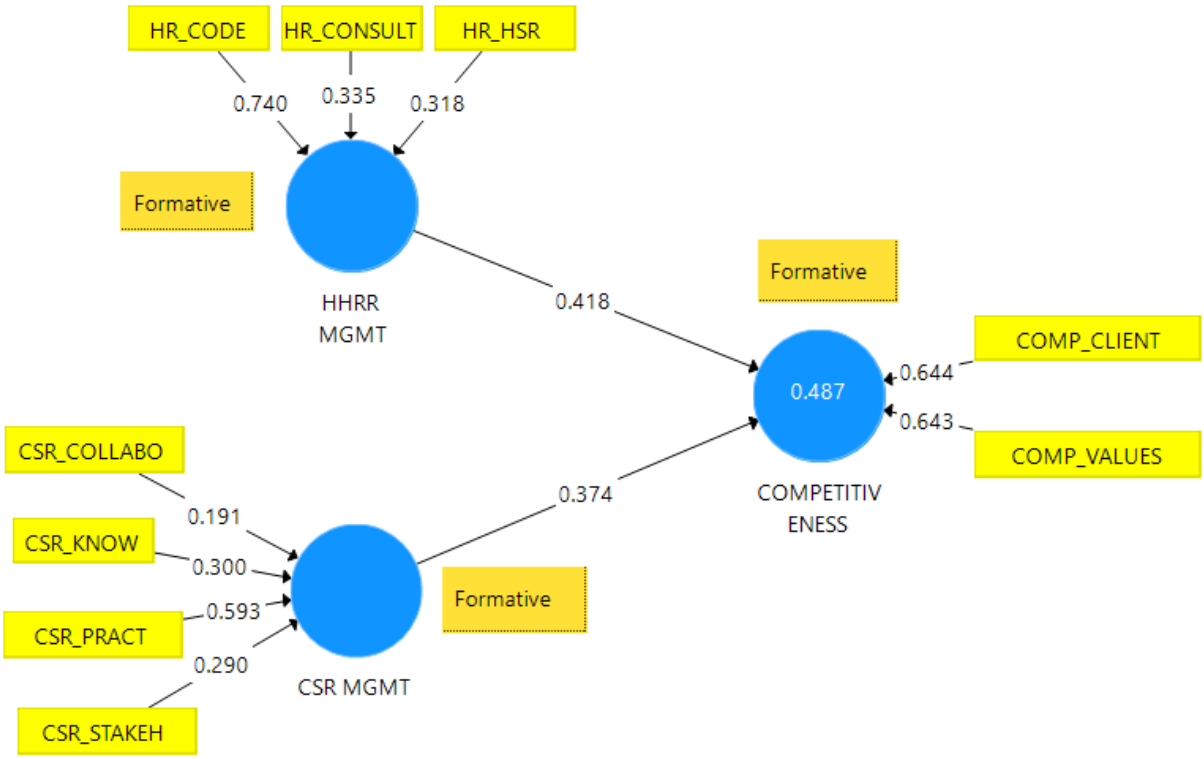
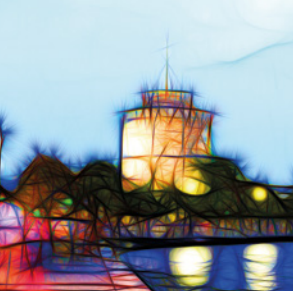


Figure 4 PLS model, with indication of weights, structural relations and R^2.
Source: developed by author



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HIGHER EDUCATION INSTITUTES-BUSINESS LINKAGES IN GREECE. THE EXPERIENCE OF COHESION POLICY 2007-2013

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It is within the context of the on-going Greek economic crisis, that policy makers and stakeholders have been widely accepting that the limits between the academic and the business community should be overcome, for instance in terms of further supporting substantial R&D networking, mobility, spin-offs, etc., and establishing institutional links between the main actors, namely higher education institutes (HEIs) and public research centers/institutes, public administration/regions and business sector, are prerequisites for improved knowledge transfer critical for restructuring domestic productive patterns and growth model. In this paper, we explore this proposition by examining the actual links established between HEIs and businesses a result of the National Strategic Reference Framework 2007-2013, the latter being the foremost public R&D financial mechanism supporting R&D activities. Empirical data was extracted from calls and projects managed by the General Secretariat of Research and Technology, while input from the Monitoring Information System dataset of the Ministry of Development had been also taken into account. Employing for the first time a micro-level analysis on R&D-related calls and projects, we show that linkages groomed on behalf of the state between the academic and business world needs to be further improved. As such, this article complements previous findings on the topic.

Keywords
Greece, HEIs-business linkages, NSRF, R&D

1. Introduction

Over a seven-year period Greece has been experiencing a deterioration of macroeconomic indicators, making it the single most hardly hit EU country. Indicatively, Greece has lost a significant part of its gross value added, while recession, weak demand and output losses have undermined job creation dynamics; unemployment rate has been ranging within markedly high levels, with youth unemployment rate still affecting more than one half of the youth labor force, thus forcing a brain drain phenomenon. It is in this context that knowledge-intensive activities have gained prominence as a motor for instigating economic growth. To this end, growing realization of the manner in which universities, public research centers/institutes (PRIs) and the private sector interact in terms of knowledge- and technology-coproduction, as well as education and the flow of human capital has become a critical point of policy intervention towards enabling economic growth. Similarly, funding

coming from EU's Structural Funds has been recognized as the main tool that can finance investment and incentivize private-level leverage in the current negative conjuncture. Standing on these two pillars, the article wishes to examine the actual interactions in terms of knowledge- and technology-coproduction between HEIs, PRIs and the private sector as a result of funding coming from the National Strategic Reference Framework (NSRF) 2007-2013. The authors wish to extend this debate by way of providing an approximation of the links established between HEIs/PRIs and enterprises in Greece as a result of this funding. We do so, by focusing on those R&D projects that necessitated the establishment of such collaborative arrangements in the NSRF's Operational research and technology relevant programs and calls during 2007-2013. To do so, data on relevant tenders and calls managed by the General Secretariat of Research and Technology (GSRT) were collected and analyzed. This analysis belongs within the wider line of research addressing the role and importance of collaborative arrangements towards enhancing the exploitation potential of research output [1, 2].

2. Historical evidence of R&D supporting activities by Structural Funds in Greece

Historically, the absence of a national programme for R&D support has been covered by funding from EU Structural Funds. The latter has been diachronically pivotal for investment and growth in Greece. The country has been a major beneficiary of EU funds, amounting to an average EU transfer between 2,4% to 3,3% of the country's annual GDP. Yet, the country channeled only small portions of these funds in R&D and innovation activities. Allocations in these matters never exceeded 2% ''in each of the 1st, 2nd and 3rd CSF'' and most probably in the 4$^{th.}$. An ''increase to 6% in the 5th CSF'' can be mostly attributed to smart-specialization strategy conditionalities [3]. During the second Community Support Framework (CSF 1994-1999), an autonomous Operational Program (OP) for Research and Technology (EPET) was included. Since then, CSFs have included research and technology support actions. In the third CSF (2000-2006), activities supporting research and technology were included in the OPs for Competitiveness (EPAN I) and for Education (EPEAEK II), respectively. 9% of EPAN I's and 6,5% of EPEAEK II's funding were actually directed towards research and technology projects, amounting to more than 700 million €[1]. All these initiatives were undertaken with the intention of contributing to the economic and productive exploitation of research results, boosting the business sector's involvement in R&D activities and applied research, and, thus, addressing the regional innovation paradox in a systemic manner.

In qualitative terms, in the CSFs of the 1990s emphasis put on regional policy in terms of national strategic planning affected the Greek research effort. Partially financed by Structural Funds, policy-making on a regional level and policy goals for research and technology strongly interacted due to a significant portion of national research policy expressed through OPs and CSFs. Despite this financial alignment, regions were involved only nominally in terms of research activities since the former had not prepared a strategy (nor detailed the strategy's elements) that would steer towards more sophisticated and knowledge-intensive productive patterns. On the contrary, the measures that were implemented regionally tended

[1] http://www.3kps.gr/2000-2006.htm

to cater for the needs of existent academic and research institutes, mainly in terms of infrastructures, largely voiced in a ‘‘bottom-up’’ manner. In the 2000-2010 period, the tendency to mix regional with research policy was mitigated, and emphasis was laid on research activities that favored applied research. Emphasis, now, was on boosting the business sector’s innovative and research performance by way of prioritizing research partnerships and intellectual property rights protection. However, as Bartzokas notes, this attempt produced mediocre results [4].

3. Higher education and business sector R&D performance in Greece. Some basic trends

Business sector’s contribution to R&D funding and performance are diachronically rather low in Greece, indicating inadequate technology diffusion throughout the economic and social fabric. Domestic production depends mainly on technology and know-how transfer from abroad and not on domestically produced knowledge, being one of the main weaknesses of the Greek innovation system. This in turn is translated to a problematic relationship between the academic communities and the business sector. Significantly low domestic demand for research and new knowledge production is widely recognized, in turn leading to a situation where Greek businesses chose to maximize their competitiveness through price-suppression methods, as opposed to investing knowledge and human capital [5]. Moreover, for the majority of companies, the quality, design, and organizational aspects appear to rank higher than the product and process aspects in their attempt to increase their innovation capability [5]. This has further deteriorated in recent years since a combination of structural problems (e.g. banking sector’s extreme stinginess in approving business loans), together with a volatile policy environment and deteriorating economic conditions and has led to a situation where businesses tend to invest in low risk activities. Closely associated is the issue of fear of business or investment failure. Greeks outrank their European peers in being very hesitant to initiate a business activity due to this fear [6].

Moreover, domestic enterprises do not participate in the so-called international value chains [7]. Greece’s inability to attract contractor-, or integrator-level global-chain business interest, in addition to the ‘‘shallowness’’ of the domestic entrepreneurship where over half of the total entrepreneurial initiatives are targeted towards final consumers, indicates that the country misses on important investment opportunities associated within the context of a global value chain [8]. The same is also true regarding the lack of trust that is observed among firms and within the productive framework. These phenomena have deteriorated during the crisis. Further, business sector’s inertia regarding knowledge intensive activities appears to be influenced by country-specific management characteristics (e.g. majority of businesses are family-owned and are very small enterprises) [6]. As a result, the orientation of business strategies to traditional economic activities has kept demand for knowledge and investments in R&D rather low [9].

On the contrary, the academic sector has been overachieving in terms of the national RTI system by way of achieving strong interactions with PRIs [10]. HEIs (universities and technological educational institutes) is the main R&D performer in Greece accounting for a significant share in total GERD, i.e. 40-45% - one of the highest among EU countries. The sector also stands as the main employer of the highly educated (PhD holders). In addition,

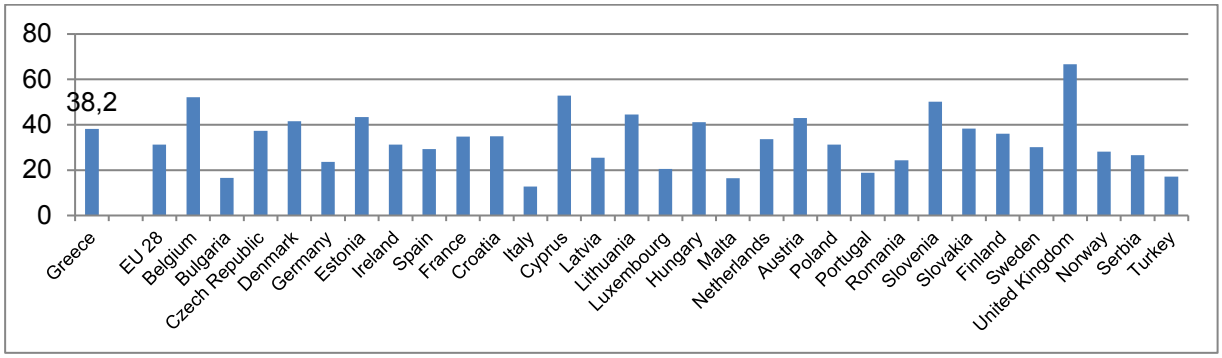
the public purse, coming from both the ordinary budget and public investment funds, has been the sector's prime funder, while funding coming from abroad (mainly the EU) ranks among the highest in the EU. Zooming in, various degrees of research and funding competence can be located between institutes and departments within HEIs. In addition, research groups do not maximize their potential through cooperation with other groups. Instead, they act in a fragmented or isolated manner [11]. Despite this, the research human capital is one of the strong points of the Greek innovation system appearing competent and competitive (especially in some fields). For example, Greek researchers have been successfully securing relatively high funds in the competitive EU Programmes – a pattern that has been made evident in more than one Framework Programmes [12], in addition to achieving high bibliometric and citation scores [13].

4. Analyzing the HEIs-business R&D linkages

In the Greek case, interactions between HEIs and business sector are rather modest, having an occasional and short term content [14]. This is the case despite the fact that the share of the R&D performed by HEIs and is funded by the business sector is higher than the EU average (2,22% and 2,90% of GERD in 2014 and 2015, respectively, compared to 1,48% of GERD in the EU in 2014) [10]. The latter argument can be accounted for by taking note that very few companies in Greece have their own R&D departments. As a result, most businesses contract such services from HEIs. Another idiosyncratic element that should be taken into consideration is that HEIs in Greece are the main R&D performers, in contrast to what is the norm in most EU countries, where the business sector dominates R&D performance and funding.

A limited business sector's contribution in research production, leads to a situation of an insufficient exploitation of knowledge production, indicatively in the form of patents or newly-set up companies [15]. Restricted access to capital, especially for new firms, due to the reluctance of financial institutions to finance innovation and risky investments is also among the factors that hinder mobilization of resources for R&D. This combination of facts reflects constraints on the demand side of the economy for research-based knowledge, at the same time that indicates the severe amount of underutilized resources, regarding human capital.

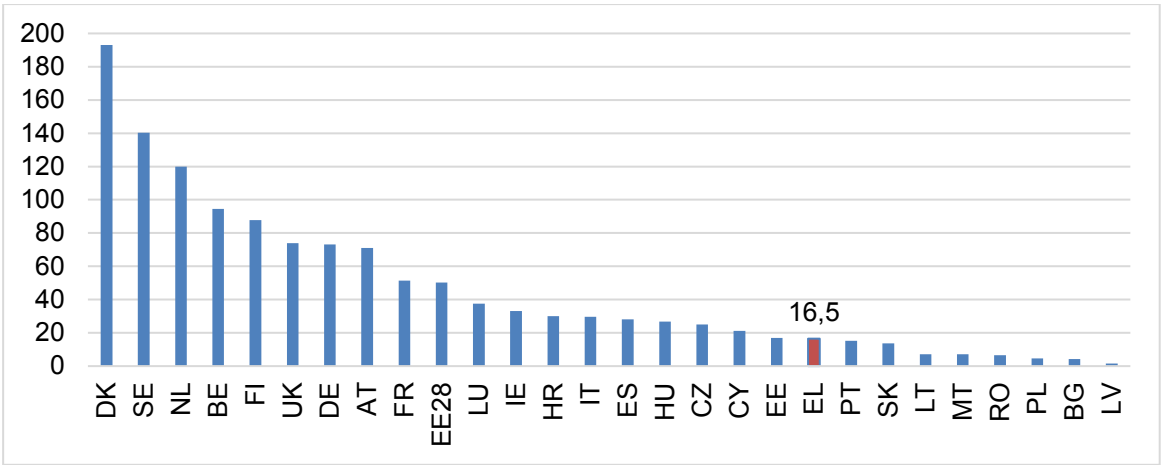
On the other hand, innovative companies are aware of their need to forge ties and collaborations for carrying out product and/or process innovation activities. Indeed, according to the 2010-2012 CIS data, a rather high percentage of these enterprises are engaged in cooperation of any type (figure 1). Collaboration with HEIs reaches only one third of these synergies.



Source: Eurostat (inn_cis8_coop)

Figure 1 Co-operating innovative enterprises 2010-2012 (% of innovative enterprises engaged in any type of co-operation)

Moreover, the level of cooperation between the main R&D performer (HEIs) and the main potential R&D user (business sector) by way of scientific co-publications in international journals is low. This implies weak knowledge flows between the two sectors (figure 2). Examining the combined research output of the academic and private sector stand as an important measure of the established knowledge networks given that scientific co-publication in international journals is an important output indicator of the two sectors capability to produce scientifically-relevant and commercially exploitable know-how. Evidently the level of co-publications in Greece significantly lags the majority of EU countries, standing at three times less than the EU average pointing to weak public-private knowledge flows.



Source: [16]

Figure 2 Public-private co-publications (per million of population)

Given the scarcity of domestic R&D funding, enterprises have been increasingly setting their eyes in the European R&D projects as a potential source of financial assistance in conducting R&D activities, in addition to establishing research partnerships and networks given their international nature. Accordingly, enterprises populate almost half of the total FP7 projects a

Greek institutional presence is recorded in. Moreover, than a quarter of enterprises have cooperated with an academic institution (HES), while almost 20% of BES participations are recorded in tandem with a government entity.

5. NSRF 2007-2013 as enabler for HEIs-business R&D synergies

As mentioned, the CSFs and NSRF have been the main way for implementing cohesion policy in Greece since the 1990s, and as such examining the R&D-relevant programs and calls can provide a comprehensive picture in terms of relevant public funding and typology of industry-HEIs linkages. During the crisis and practically after 2010, funding from EU's Structural Funds stood as the major developmental public mechanism [16]. NSRF played a critical role in increasing the research funding during the crisis, especially between the years 2013-2015, resulting in an increase of the country's R&D intensity [17]. Following the rationale of our analysis, the article lays emphasis on the synergies developed between academia and the business sector funded by the NSRF's Operational research and technology relevant programs and calls during 2007-2013.

According to programmatic objectives, these initiatives sought to enhance the interaction between the private and public sector (HEIs and PRIs) by increasing the ''entrepreneurial contribution in the research effort'', and by ''linking the RDI with the national productive nexus''. NSRF's actions that were directly or indirectly related to research, technological development, innovation and entrepreneurship amounted to almost 10% of the total budget of the programme in 2007-2013 [18], but data collected from the Monitoring Information System (Ministry of Development)-reveal that apart from calls and activities managed by the General Secretariat of Research and Technology (GSRT), higher education sector-business sector collaborations had exclusively to do with operational contracts and sub-contracts other than R&D or knowledge-intensive activities, while detailed data for funding and support schemes under the state aid mechanism were not available. Therefore, our analysis is based on input obtained from NSRF-funded GSRT calls. These calls constitute the core of the RTDI-supporting activities funded by EU's Structural Funds. The total budget for these activities amounted to 700 million € (approx. 3,5% of the total NSRF budget).

Taking into consideration data availability on specific tenders and calls, more than 40 GSRT R&D programmes were examined, representing a total budget of 500 million €. These cover a wide range of R&D actions from ''science & society'' activities and programmes supporting ''international scientific cooperation'' to activities strengthening the ''human potential'' and supporting "innovation of SMEs". These programmes can be categorized in the following manner. In more than half activities (22) only HEIs and/or PRIs were eligible to participate, while 10 allowed participation from both sectors – HEIs/PRIs and businesses. Collaboration, however, was not compulsory. These schemes represented 10% of total GSRT funding. Only 7 (out of 40+) programmes focused in supporting the uptake of research-technology-innovation activities on behalf of businesses (11% of funding). Lastly, two major funding schemes (Synergasia) explicitly sought the collaboration between HEIs/PRIs and the business sector (30% of funding) (see Table 1).

Table 1 Intersectoral focus of GSRT programmes

No.	Programme no.	Sectoral focus	Type of collaboration between HEIs/PRIs and business collaboration	% of total GSRT R&D actions (*)
1.	22+	HEIs/PRIs	Non existent	25%
2.	10	HEIs/PRIs and businesses	Optionally	10%
3.	7	Businesses	Non existent	11%
4.	2	HEIs/PRIs and businesses	Obligatory	30%

(*) For the remaining % of GSRT R&D actions, no detailed data was available.

Highlighting HEIs/PRIs and business R&D synergies, analysis focuses on the second and the fourth category of activities. Consequently, we examine 408 projects, in total[2]. Accounting for these two categories, results indicate a significant degree of collaborative arrangements having been established between HEIs/PRIs with enterprises. Collaboration is manifested in about 90% of these projects. By excluding the two ''Synergasia'' programmes, where collaboration between HEIs and/or PRIs with the business sector was a precondition in order to participate in the programme, the rate of collaborations drops to approximately 65%. In actual financial remuneration, HEIs/PRIs received more than 120 million €, while the business sector received slightly above 100 million € (out of which 60 million in the form of public spending). Again, excluding the two ''Synergasia'' programmes that had the highest budget among all GSRT calls and programmes in the NSRF 2007-2013, actual funding is reduced to 15 million for HEIs/PRIs and 16 million for businesses (of which 12 million in public spending) (see Table 2).

Table 2 GSRT activities/programmes directing both to HEIs/PRIs and businesses

Activity / programme	**HEIs & PRIs budget in collaboration with BES (thousand €)**	**BES budget in collaboration with HEIs/PRIs (thousand €)**	**Budget of projects without collaboration (thousand €)**
JTI1	568,3	1.052,6	1.933,7
Artemis JTI_1	745,4	829,8	1.196,3
Eniac JTI_1	476,2	2.204,3	453,1
Artemis JTI_2	648,9	707,1	1.374,2
Eniac JTI_2	705,9	1.123,6	0,0
Eranet_3	0,7	0,9	1.574,9
Greece-China	6.275,3	8.448,0	622,4
Greece-Israel	4.137,7	4.762,8	730,6
Greece-Germany	1.378,4	874,6	3.021,3
Synergasia_1	54.464,5	38.499,4	0,0
Synergasia_2	53.587,3	48.081,2	0,0

[2] Quantitative analysis did not take into account 'Clusters' activity (17,5 million €), due to the inability to discern HEIs/PRIs from business sector, as well as enterprises that are directly related to research teams from HEIs and PRIs.

3. Conclusions

The paper showed that innovation-related interactions as induced by NSRF's policies and financial mechanisms between HEIs and PRIs were not strong. This was shown by analyzing for the first time NSRF's R&D-related programmes and activities that were funded from GSRT. By way of examining these call, a one-sided approach towards funding research activities as opposed to innovation activities was made evident. This was made possible by way of highlighting those instances where collaboration between HEIs/PRIs and the private sector was dictated from the rules of participation. With the exception of the relevant programmes wherein collaboration between HEIs/PRIs and the private sector was deemed as a prerequisite according to the rules for participation, in all other programmes (where the issue of collaboration is left upon the will of the participants to decide) the rate of collaboration is decidedly lower. Thus, it appears that these programmes insufficiently nurture for the creation of innovation-targeted linkages. This implies sub-optimal exploitation of research and knowledge production, as well as inadequate technology diffusion throughout the economic and social fabric.

NSRF funding directed to grooming for R&D has followed by and large the pattern of previous CSFs. HEIs and/or PRIs actively seek to cooperate with businesses only in those R&D projects, where synergies were a precondition to participate, indicating the importance of legislative arrangements as a means to incentivize such collaborations.

A number of issues arise in this context. For example, funding for R&D, in general, and funding that links HEIs/PRIs and businesses, in particular, is limited (according to our analysis resources for these specific R&D synergies represent only 1% of total NSRF funding). Yet, the road to a knowledge-based economy is dependent upon the strengthening of both these instances.

Last but not least, the issue of collaboration arrangements and its sustainability beyond the scope of the specific programme is a point worth further considering. That is, the issue of the ad hoc and superficial manner in which these partnerships are formed - just to cover typical preconditions or prerequisites of the relevant call. Bringing to the fore successful collaboration schemes and analyzing the manner in which this was made possible so as to replicate, is a case for future research. While HEIs have an important role to play in respect to economic and social growth, full potential can only be accomplished with enacting collaborative arrangements in an embedded manner with the private sector [19, 20]. Towards this, orientation on behalf of the Greek state at least in terms of funding and tender orientation can be further increased.

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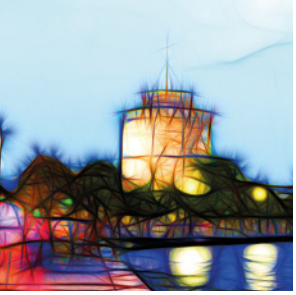

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EXTENDED CONCEPTUAL FRAMEWORK FOR BUSINESS ANALYTICS SUPPORTING INNOVATIONS

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In the modern world of developing technology and competitive market, a key factor for development and success of organizations is the convenient and realistic business strategy. Business analytics are useful and appropriate tools supporting management to take strategic, managerial and business decisions. In this paper, we propose taxonomy to the existing framework of the business analytics capabilities in order to achieve deeper clarity regarding the importance of the use and integration of analytics in modern industrial ecosystem and their contribution to the innovative capacity of the organization. The integration of analytics is an essential part of designing, building and maintaining a successful and sustainable business strategy. Companies integrate analytics into their corporate structures to maintain their competitiveness on market and to generate positive financial results. We propose a classification framework of integration of analytics in business named CSPD Integration of Analytics (*Conceptual, Specialized, Platform, and Data Integration of Analytics)*. We present an analysis of the capabilities of business analytics and make a proposal for a specific design in terms of evaluation and visualization of capacity for innovation in the organization. We are examining their role as strategic innovation tool according to Industry 4.0 improving company services and business model, reliability and continuous productivity, IT security, machine and employee safety, shortage product lifecycles and monitor industry value chain.

Keywords
Business Analytics, Business Analytics Capability Framework, CSPD Integration of Analytics, Industry 4.0, Software Analytics

1. Introduction

In the modern world of developing technology and competitive market, a key factor for development and success of business organizations is the convenient and realistic business strategy. Business Analytics (BA) and different types of analytics are useful and appropriate tools supporting management to take strategic, managerial and business decisions. Companies use, integrate analytics as part of the monitoring process, and control the implementation of predefined key indicators. A common understanding of the analytics refers to the detection, analysis and use of information obtained after the processing of huge amount of structured and unstructured data. A number of statistical, mathematical, computational methods with specific and defined purpose for data manipulation accomplishes

this. The visualization of these results happens by an adaptable to user method for visualizing the data.
In this article, we present an analysis of the capabilities of business analytics and make a proposal for a specific design in terms of evaluation and visualization of capacity for innovation in the organization. We are examining their role as strategic innovation tool according to Industry 4.0 improving company services and business model, reliability and continuous productivity, IT security, machine and employee safety, shortage product lifecycles and monitor industry value chain.
Examples of use of this framework are the software analytics aimed mainly at software development. IT defines Big Data as the analysis, synthesis and transformation of large amounts of structured and unstructured data into understandable business information, which supports making quick and reactive strategic and business decisions. In the large volume of data, there is information from historical type - information and data from the past. The Analytics allows you to display this information in an appropriate and comprehensible manner and allow for trend-based interpolation based on present and future data.
In this paper, we prose taxonomy to the existing framework of the business analytics capabilities in order to achieve deeper clarity regarding the importance of the use and integration of analytics in modern industrial ecosystem and their contribution to the innovative capacity of the organization. We propose a classification of integration of analytics in business named **CSPD Integration of Analytics** (*Conceptual, Specialized, Platform, and Data Integration of Analytics).* BA fulfil their role as strategic innovation tool with the CSPD Integration of Analytics and the methods and metaphors for data visualization used by them.
This paper consists of the following sections. Next section represents the definition of analytics and the common understanding of them. Section 3 explain the concept of data and the relation between data, information, and knowledge. Then we focused on the topic related to data Integration of analytics and types of analytics. Section 4 presents business analytics, business analytics capabilities, business analytics framework, an extension on that framework, software analytics and data visualization.

2. Analytics and Integration of Analytics

2.1. Analytics

The new technological era and the trends related to it, as well as the constantly growing in size and scale data or *big data*, and fast changing markets around the world require the use of analytics. In this paper we use the definition of analytics proposed by Davenport and Haris [1] „the extensive use of data, statistical and quantitative analysis, explanatory and predictive models, and fact-based management to drive decisions and actions […] Analytics are a sub-set of […] business intelligence. […] The analytics may be input for human decisions or may drive fully automated decisions". The use of analytics provides an informative way of understanding a valuable information and it is a crucial part of the management of a company. The Analytics generate value in the industrial ecosystem, support the processes of decision-making and fact-based management and contribute for the innovative capacity of the business organization.

2.2. Conception of Data

The term Big Data is very popular and it is has many different interpretations. Generally, the definition for Big Data relates to "dynamic, large and complex volumes of data being created by people, tools and machines. This data requires new, innovative and scalable technology to collect, host and analytically process the vast amount of data gathered in order to derive real-time business insights that relate to consumers, risk, profit, performance, productivity management and enhanced shareholder value" [2].
The definition for Big Data consists the "4V's" that characterize Volume, Velocity, Variety, and Veracity of data [2, 3]. The advanced definitions for Big Data where Big Data has "5V" properties or even "7V". Two groups divide the properties into *Native/original* Big Data properties, which includes - Volume, Velocity, Variety and properties acquired because *of data initial classification and processing* in the context of a specific process or model - Value and Veracity [4].
It is a well-known fact that one of the most important business assets possessed by a company is the information. The competitive market and emerging new technologies are forcing the companies to take action and to realize the importance of *valuable information* for the business. More specifically companies seek knowledge extracted from large scales of data, or *big data*.
The *valuable information* represent a result from analysis of trends, pricing, customer behaviour, business assets of the company, market, different microeconomic and macroeconomic models and others. Based on that important business information, analytics design and build predictive models, forecasts, statistical analysis, scoring, alerts, simulations and others.
The knowledge or *business knowledge* is a factor supporting strategic, informative and reactive business decisions. The application of analytics is very important for solving a specific business problem and achieving objectives. Analytics detect, collect, analyse, process, use and interpret data for solving specific business problems. The valuable business information - acquired as a result from the application of analytics and visualized with special methods and metaphors for visualizing data, is managed, deployed and valued by the management. The use and interpretation of that information relevant to specific business context develops and builds business intelligence and business knowledge.

2.3. Integration of Analytics

The integration of analytics is an essential part of designing, building and supporting successful and sustainable business strategy. Companies seek to integrate analytics into their corporate structures to maintain their competitiveness, overcome the challenges associated with large volumes of data and generate value and positive financial results. Authors propose a classification of integration of analytics in business named **CSPD Integration of Analytics** (*Conceptual, Specialized, Platform, and Data Integration of Analytics).*The classification includes the following definitions:

- *Conceptual Integration of Analytics* – overall business strategy applicable in the industrial ecosystem.
- *Specialized (Specific) Integration of Analytics* – business strategy for integration of Analytics applicable in different industrial sectors and in different business levels.

- *Platform integration of Analytics* – business strategy for integration of analytics applicable concrete platform – operating software systems, devices, multi-platform migration and application.
- *Data integration of Analytics* – business strategy for integration of analytics applicable in concrete circumstances for processing data and data warehouse related to specific business problem or objective.

The classification CSPD Integration of Analytics includes all three types of analytics .They are used and integrated in this classification in order to present the meaning of those instruments as tools supporting business processes and generating positive financial results and value. The analytics could be a specialized integration mix of *Descriptive, Predictive, and Prescriptive* analytics in specific industrial sector or in different business levels, as well as platform and data integration of analytics.

2.4. Types of Analytics

There are many definitions and interpretations of different types of analytics, but the most popular classification of analytics divides them into three groups: *Descriptive, Predictive, and Prescriptive* and it is illustrated in Table 1 [5]. The combination of those instruments is often used. Everything is defined around a specific business problem or objective.

- *Descriptive analytics* represents "The application of simple statistical techniques that describes what is contained in a data set or database." [6]**.** They usually use data aggregation and data mining to provide the needed insights related to the past and trying to answer the question – "What has happened?" Examples of descriptive analytics are L&T Technology Services [7], Deskmetrics [8] and many others. Deskmetrics is an industry-leading desktop software analytics tool which offers a range of custom analytics and its' powerful reporting tools provide the possibility to monitor user engagement at a granular level [8]. This is a real-time analytics software and therefore as a Descriptive analytics like many others, it supports the management to take strategic, managerial and business decisions.
- *Predictive analytics* represents "an application of advanced statistical, information software, or operations research methods to identify predictive variables and build predictive models to identify trends and relationships not readily observed in a descriptive analysis [6]". Predictive analytics try to understand the future using different statistical models and forecast techniques. The goal is to answer the question –"What could happen?" Examples of predictive analytics are many. Several popular are ABM [9], IBM - SPSS Predictive Analytics Enterprise [5], RapidMiner [11], and others. RapidMiner is among the world's most widespread and most used open source data mining solutions. RapidMiner features a powerful user interface that enables users to create, deliver and maintain predictive analytics and to create very advanced workflows. It also features data integration, transformation, machine learning and application integration. The benefit of the use of this tool consists in increased productivity and efficiency [12].

Table 1 Types of Analytics

UNDERSTANDING ANALYTICS Definitions, sample applications and opportunities, and underlying technologies			
	Descriptive	**Predictive**	**Prescriptive**
	What **HAS** happened?	What **COULD** happen?	What **SHOULD** happen?
What the user needs to **DO**	• **Increase** asset reliability • **Reduce** labor and inventory costs	• **Predict** infrastructure failures • **Forecast** facilities space demands	• **Increase** asset utilization • **Optimize** resource schedules
What the user needs to **KNOW**	• The **number and types** of asset failures • Why **maintenance costs** are high • The value of **materials inventory**	• How to **anticipate failures** for specific asset types • When to **consolidate underutilized** facilities • How to **determine costs** to improve service levels	• How to **increase** asset production • Where to **optimally route** service technicians • Which strategic facilities plan provides the **highest long-term utilization**
How analytics gets **ANSWERS**	• **Standard reporting** – What happened? • **Query/drill down** – Where exactly is the problem? • **Ad hoc reporting** – How many, how often, where?	• **Predictive modeling** – What will happen next? • **Forecasting** – What if these trends continue? • **Simulation** – What could happen? • **Alerts** – What actions are needed?	• **Optimization** – What is the best possible outcome? • **Random variable optimization** – What is the best outcome given the variability in specified areas?
What makes this analysis **POSSIBLE**	• Alerts, reports, dashboards, **business intelligence**	• Predictive **models**, forecasts, statistical **analysis**, scoring	• Business rules, organization **models**, comparisons, **optimization**
BUSINESS VALUE			

- *Prescriptive analytics* represents "an application of decision science, management science, and operations research methodologies (applied mathematical techniques) to make best use of allocable resources" [6] Prescriptive analytics mainly use optimization and simulation algorithms to advice on possible outcomes and try to answer the question "What should happen?". Prescriptive analytics are used in various scenarios where there are too many variables, options, constraints and data sets and to effectively evaluate those scenarios [13]. Example of prescriptive analytics is Ayata [14], Lily Enterprise [15], and many others. Several Big Data start-ups focus especially on perspective analytics and popular example is Ayata, which use patented software to predict what is going to happen, when it is going to happen and why it is going to happen. The prescriptive analytics defines the best possible solution to a specific problem [13]. The Company "Ayata" holds the rights on the trademark for the (capitalized) term Prescriptive Analytics. The Sanskrit word for "future" is exactly the name used by this company [16].

The different types of analytics and their place into the classification CSPD Integration of Analytics are closely related and defined. The management of a company must research and choose the appropriate integration of three types of analytics suitable for a business strategy of their company. The well-defined integration of analytics according to the classification CSPD Integration of Analytics support the management by providing an easy-to-understand classification for integration of these tools. This contributes to the understanding of analytics and their role as useful instruments supporting the processes related to decision-making and fact-based management contributes to innovative capacity of the company.

3. Business Analytics and Business Analytics Capabilities

3.1. Business Analytics

Nowadays there are many definitions of business analytics and their interpretations are possible in many aspects. Based on scientific research on many publications and books in the field of analytics, there are several definitions.

The use and the integration of analytics according to classification CSPD Integration of Analytics contribute for the innovative capacity of the company. Business analytics and their business capabilities support the processes related to decision-making and management based on facts. They also represent a key factor for the development of innovation in the business organization. The companies implement the business analytics capabilities into their business structures on different level of integration (CSPD Integration of Analytics) in the way of solving a specific business problem or achieving an objective.

According to classification defined by Davenport and Haris [1] business analytics confirm its position supporting the processes of business decision-making. BA use information, statistical and quantitative analysis, explanatory and predictive models and management based on facts. These statements substantially confirms the thesis of the need for mass integration of analytics, and especially business analytics in the industrial ecosystem. The presence of such instruments and their promotion and integration into organizations would contribute to the economic development of the organization, which may lead to positive financial result for the organization and business.

Business analytics goes beyond the boundaries of the concept of analytics. In particular because Business analytics require *direct relation to business* and a *resulting insight* implemented into the business in the future, and the performance and measurement values based on metrics will lead to a successful business result [6, 17]. Increasingly companies resort to the use of business analytics and their implementation in present/future projects. The management of a company can use the valuable data processed by analytics as a precautionary measure against possible bankruptcy caused by incorrectly calculated organizational resources. Therefore, the interest in business analytics is growing.

The development of information technologies requires innovative approaches for collecting and analysing data from both internal and external organizational sources of information [18]. The Business Analytics main purpose for business relates to the processing of big data in real-time, visualizing results to help and support the management of an organization by evaluating, interpreting and using this valuable information to maintain competitiveness of organization and generating positive financial results.

3.2. Business Analytics Capabilities

Business Analytics Capabilities (BAC) is a topic of extensive scientific research [20]. That's why it is important to define the main capabilities of analytics and business analytics and to understand the valuable impact which they have on business, as well their role as a driver for supporting reactive strategic and business decisions.

Nowadays the term Business Analytics Capabilities is often associated with "Individual skills, tacit forms of knowledge, social relations that are embedded in a firm's: routines, managerial processes, forms of communication and culture […]. As well, it refers to capability as a

special type of a resource whose function improves the productivity of other resources. This implies that resources can represent a cluster of elements that constitute a capability" [19]. It is very important for management to understand the importance of those capabilities and the use of business analytics. Our society becomes digital every day, it is only meter of time before the majority of competitors understands that importance and the advantages of the use of business analytics and their capabilities [20].

We presented different types of analytics and their classification according to CSPD Integration of Analytics. This integration represent an implementation of their capabilities in business. BAC contribute for innovative capability of the company.

4. Business Analytics Framework

The BAC defined in table 2 [21] represents a framework of BAC. There are four main capabilities areas: Governance, Culture, Technology and People. This analysis is well structured and well defined and it can be used as a spine for extending and building on it new BA Capabilities.

Table 2 Overall BA Capabilities

VALUE AND COMPETITIVE ADVANTAGE				
OVERALL BUSINESS ANALYTICS CAPABILITY				
CAPABILITY AREA				
BUSINESS CAPABILITIES	**Governance**	**Culture**	**Technology**	**People**
	Decision Rights	Evidence-based Management	Data Management	Technology Skills and Knowledge
	Strategic Alignment	Embeddedness	Systems Integration	Business Skills and Knowledge
	Dynamic BA Capabilities	Executive Leadership and Support	Reporting BA Technology	Management Skills and Knowledge
	Change Management	Flexibility and Agility	Discovery BA Technology	Entrepreneurship and Innovation

Gartner [22] gives another example of business analytics framework where Gartner extend and divide the BA framework in several categories. The framework includes *Program Management, Metadata, and Services.* Gartner added and defined the Program Management as a mechanism for prioritizing projects and allocating resources within business analytics initiatives. The Metadata and Services are used for creating a common way of describing information assets across the enterprise and integrates the various metadata schemas that may be in use in different parts of the enterprise, and must also incorporate external sources" [22]. Every aspect of this framework is based on concrete business objectives and constraints. The key findings of Gartner's Framework are summarized in the diversity and interrelationships of the analytic processes into the enterprise and their integration into enterprise supporting strategic, reactive, informative business decisions [22].

4.1. Extend of Business Analytics Framework

The topic related to BAC Framework has undergone many changes for the last years. That is why it is necessary to make some additional changes to that framework as the authors of this paper propose in Table 3.

Table 3 Developed Framework of BA

MANAGEMENT				METADATA AND SERVICES
	INFORMATION			
	PERFORMANCE			
	BUSINESS STRATEGY			
	INNOVATION			
	ENTERPRISE METRICS			
	People Capabilities	**Process Capabilities**	**Platform Capabilities**	
	Consume	Business and Decision	Decision	
	Produce	Analytic	Analytic	
	Enable	Information & Infrastructure	Information	

The depicted framework includes not only the three main pillars recognized by Gartner's Framework, but also it focuses the attention to the main capabilities of analytics: People Capabilities, Process Capabilities and Platform Capabilities. The integration of analytics in companies is a crucial element of the management of technologically evolving enterprise. This integration must be done specifically in order to resolve concrete business problem or objective. For that reason, we propose to integrate the factor "Innovation" in our framework as a base factor in the list of factors including "Information, Performance, Business Strategy, Enterprise Metrics, Management and Metadata and Services". The application of business analytics capabilities and the integration of analytics into business processes are drivers for innovation. The new technological era and competitive market require the need of innovation and new analytical and strategic instruments.

4.2. Business Analytics and Industry 4.0

The term named "Industry" 4.0 refers to the fourth Industrial Revolution. It originates in Germany, 2011. It was a project of the German government with the objective to promote the computerization and innovation of manufacturing. It is estimated that in 2020 thanks to the Internet of Things (IoT) and cyber physical systems at least 60 billion intelligent objects will be online. Industry 4.0 becoming the symbol of Smart Factory, Smart Manufacturing, Big Data, Internet of Things [23]. The Industry 4.0 also refers to the application of 9 foundational technologies depicted in Figure 1 [24]: The technologies are: Autonomous robots, Simulation, Horizontal and Vertical system integration, The industrial Internet of Things, Cybersecurity, The Cloud, Augmented reality, and Big data and analytics.
Business Analytics are relevant to Industry 4.0. The integration of analytics and implementation of industry 4.0 will lead companies into the next step forward towards the new

technological era which industry 4.0 represents [24]. The digitization of company's horizontal and vertical value chains and other applications of advanced-technologies requires specific tools like business and software analytics.

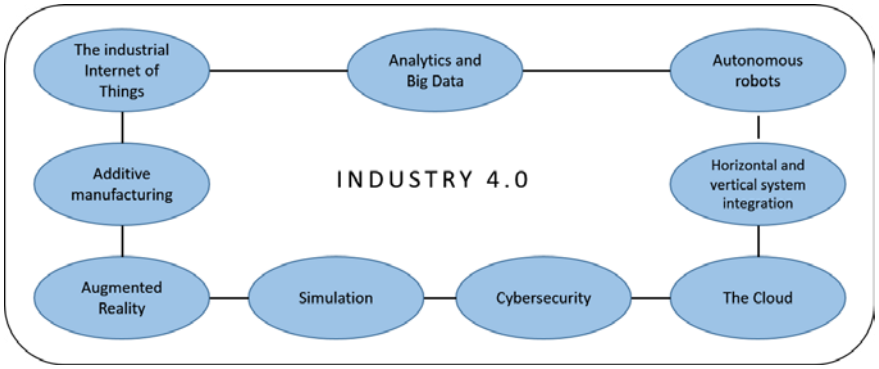

Figure 1. Nine foundational advances of Industry 4.0

The classification CSPD Integration of Analytics and Business Analytics Framework fits well in the processes related to Industry 4.0. Both the classification and the framework becomes a fundamental part in the system of innovation in Industry 4.0. The analytics processes data, produce results and describe an overall basis for strategic decision-making related to the development of the company and management of innovative potential and innovative capabilities of the company.

4.3. Software Analytics

In general, the topic about software analytics is very popular and it is developing every day, especially because software analytics are using the latest and modern methodologies and technologies for data mining and analysis. The definition of software analytics relates to the definitions of analytics mentioned above. Software analytics closely relates to technological advances of Industry 4.0, in particular Software analytics utilize data-driven approaches to enable software practitioners to perform data exploration and analysis. The main objective of software analytics is to obtain the important *insightful* and *actionable* information from software artefacts to help software practitioners accomplish their target tasks in the field of software systems, software users, and software development process [25, 26, 27, 28].

Software analytics visualise the data results provided by them. The main purpose of data visualization is to present visually data in a manner that is understandable and flexible to the needs of the user. This is done with methods and techniques for visualizing data. For example, these techniques give the opportunity for viewing and describing data, identifying relationships, patterns, trends, processes, states, and many others. The management of the enterprise use these visualizations for taking informative and strategic business decisions. In software engineering, the business decisions relates to the software development processes such as specification, design and implementation, validation, evolution.

Software Analytics fits into the CSPD as well as business analytics. For example, data analytics represent visualization of different types of metrics over source code in software product, using different types of metaphors like codecity and codemap.

5. Conclusions

Modern market trends require integration, automation, visualization, virtualization, high quality and accurate forecasts, innovation. Business analytics and business analytics capabilities, as well as new methods of visualization are important business tools that consolidate the need to integrate such tools in the industrial ecosystem.

The contributions of analytics and integration of analytics into the business organization relates to:

- Increase the capacity of innovation;
- Design, build and maintain successful and sustainable business strategy;
- Achieving competitiveness of organizations;
- Factor to facilitate the decision-making processes in business management;
- Achieving an optimal balance between functional and quality attributes of the software architecture using the services of business analytics and software analytics;
- Facilitate implementation of present/future projects using the services of analytics, business analytics, and software analytics and integrating their capabilities in the industrial ecosystem;
- Diversity of methods and metaphors for data visualization.

In this paper, we proposed a taxonomy to the existing framework of the BAC in order to achieve deeper clarity regarding the importance of the use and integration of analytics in modern industrial ecosystem and their contribution to the innovative capacity of the organization. The integration of analytics is an essential part of designing, building and maintaining a successful and sustainable business strategy. Companies integrate analytics into their corporate structures to maintain their competitiveness on the market and to generate positive financial results. We proposed a framework called CSPD Integration of Analytics: *Conceptual, Specialized, Platform, Data Integration of Analytics.*

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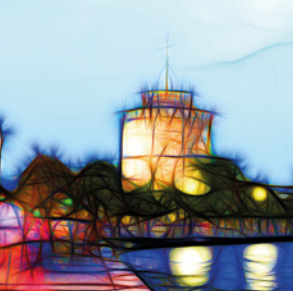

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A NOVEL TECHNOLOGY TRANSFER OFFICE TYPOLOGY BASED ON LESSONS LEARNT FROM THE UK

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Developing countries are increasingly establishing technology transfer offices (TTOs) recognising that these can play a potentially significant role in facilitating the successful transfer of technologies and knowledge between universities and industry. However, many TTOs in developing countries operate inefficiently and seek to learn from developed world practices. Whilst research on the characteristics of TTOs and their performance is growing there is still much to understand even in developed nation TTOs. We contribute to this area by using novel primary data gathered from UK universities to create a typology of technology transfer offices (TTOs) based on the combination of their mission statement, governance structure and maturity. Using the conceptual Maturity Model of TTO efficiency developed by Secundo et al (2016), an online questionnaire was developed and sent to 116 universities in the UK. Eight of the 20 respondent universities were interviewed about their range and types of practices. We found correlations between the maturity level of the TTOs mission statements and their governance structures. We suggest this emerging typology may assist TTOs in developing countries to be more efficient by appropriately aligning their mission statement, governance structure and maturity.

Keywords
Developing Countries, Efficiency, Mission Statement, Technology Transfer Office, Typology

1. Introduction

Developing countries strive for developed nation status. A critical step is to transform from a resource-based to a knowledge-based economy (KBE) [1]. A KBE requires the establishment of a national innovation system (NIS) in which a network of institutions in the public and private sectors, interact to develop, import, modify and diffuse new technologies [2]. Appropriately configured and effectively organised NIS's can help reduce poverty and improve income distribution in developing nations [3]. A key element within NIS is the establishment of good university–industry linkages [4] which facilitate technology transfer (TT) from the science base to industrial application as evidenced by the successful commercial TT from university to industry in the USA, UK and Australia over the last 20-30 years [5]. Developing countries have attempted to emulate these countries by typically formalizing the Intellectual Property Rights (IPR) of universities and creating Technology Transfer Offices

(TTOs) [6]. Yet TTOs in developing countries take a reactive (case by case basis) rather than a proactive (strategic and well-defined) approach to TT and several studies reveal many TTOs operate inefficiently [6,7,8,9]. Whilst it has been suggested shared experiences between TTO leads to learning and improved efficiency in their TT processes [7], we believe improved efficiency in turn, correlates with the antecedent characteristics of TTOs. Understanding antecedents becomes particularly important in the case of developing countries, where even well understood technologies are often adopted with limited success [10]. We investigate this among a small sample of 8 UK university TTOs using a novel tool previously developed by one of us [10] and data gathered from semi-structured interviews from which the antecedents of organisational governance and mission statements were identified. We find some limited support for our propositions.

2. Literature Review

2.1 Mission Statements

The academic literature on mission statements is limited, but identifies three core purposes of mission statements; as a guide to decision making, as a communication tool, and as a tool in directing the formulation and implementation of strategic planning [11]. It has been suggested [12] that during the establishment phase of TTO's (which many developing countries are in) understanding and defining the purpose and intent of a TTO is an important, but not simple, task. However, given TTOs operate in different environments, one might expect them to develop differentiated missions and therefore mission statements. The university plays an important role in defining the mission statement of its TTO, setting the TTO's objectives, assigning the funds for TTO activities and defining the relationships with other university structures [13] i.e. defining governance structures.

2.2 Organisational Governance Between Universities and Their TTOs

In the USA, the enactment of the 1980 Bayh-Dole Act, formalized the IPRs of universities. Consequently, the original mission of TTOs was to derive economic benefits for the university from TT and this is reflected in their core activities i.e.: intellectual property (IP) protection support, research support and spin-off support. As such, early studies considered TTOs to be centralized and hierarchical structures, embedded at the central level of the university [13]. As TTOs have been adopted by other American universities and universities in nations beyond the US, greater variance in the governance structure has been identified with respect to the degree of autonomy granted to TTOs. This is reflected in the variety of ways in which TTOs are organized e.g. an internal centralized office, an internal decentralized office, an external non-profit research foundation, or a for-profit venture [14]. Furthermore, hybridizations of these organizational structures have been suggested to enhance the efficiency of the TTO. However, given that the goal of TTOs can be identified as knowledge transfer, an analysis of the organizational structures of TTOs requires a model of their core activities [13]. Recent research therefore includes the degree of discipline specialization, degree of task specialization, and degree of exclusivity highlighting the emergence of various regional TTOs or technology transfer alliances [15]. However, none of these typologies

consider the mission statement as a factor influencing the organizational governance of the TTO and how alignment between these correlates with TTO efficiency.

2.3 TTO Efficiency

Seeing as TTOs are central to a process as complex as TT, it is important to know how efficient a TTO is at conducting its missions [8]. The efficiency of a TTO is often considered as the conversion rate of inputs (research funding) to outputs (patents, licenses and spin-off companies) [16, 17, 18]. Yet, TTOs face many challenges in this endeavour, such as an unconducive university culture and a lack of complementary assets [8]. A survey on TTOs in the USA found that over 50% lose money on their TT operations while only 16% are self-sustaining [6]. Similarly, in TTOs across Europe, just 10% of TTOs secure 80% of all licensing deals, and the top 2% of TTOs across 6 countries capture 40% of licensing revenue [7]. In the case of developing countries' university TTOs, despite the adoption of new IPR legislation, this has not resulted in an efficient approach to technology transfer in these standard output terms. We follow the principles of others [19] in defining TTO efficiency on other grounds and detail this in the methodological section that follows. Importantly, we suggest that if the mission of the TTO is clearly defined and accordingly structured, it does lead to increased efficiency [12]. We now outline our data and methodology that is used to examine whether the combination of TTO mission statement and governance structure correlate with measures of TTO efficiency.

3. Data and Methodology

3.1 University Technology Transfer Offices in the UK

We have used TTOs in the UK as the sample for this study. The US Bayh-Dole Act created a strong orientation towards the commercialisation of university created IP in US TTOs. Developing nations are technologically less advanced and their IPR systems less established than the US model, and therefore US TTOs are less relevant to developing nation TTOs. Contrastingly, whilst the UK has one of the world's leading research systems, it has no counterpart to the Bayh-Dole Act, as such UK TTOs were not established with the same commercial mission in mind as those in the USA. Moreover, in the UK public universities (there are very few private ones and these tend to be teaching focussed) have charity status and as such cannot engage in commercial activities directly [20]. The longevity of TT activity in the UK (since at least 1987) and the ways in which it contributes to UK economic growth, and the scale and activities of their TTOs are also more comparable to other countries making it a good frame of reference and basis of policy recommendations for developing nations. The UK government uses the Research Excellence Framework (REF) to assess and reward universities and departments that have achieved international scientific excellence. The REF utilises three criteria namely: research output, impact and environment. Within outputs, the originality, international significance and rigour of research outputs (e.g. publications) are assessed and carry a 65% weighting of the overall outcome. The vitality and sustainability of the research environment carries a 15% weighting. Lastly, impact carries a weighting of 20% and assesses the reach and significance of excellent research on the

economy, society and/or culture (including impact on teaching, policy and practice). In this way, the 'impact' element of REF aims to build bridges between universities, business, and society [21] which are arguably a more relevant and broader set of objectives that TTOs from developing nations should be striving for. Universities in the UK are categorised as pre-1992 and post-1992 universities (including former polytechnics which were granted university status post 1992). The pre-1992 group are typically more research-focussed. Within the pre-1992 group, 24 universities known collectively as "the Russell Group," account for around 15% of all universities but 75% of all research income. Research has shown [20] that UK universities located in regions with higher levels of R&D and contributions to GDP appear to be more efficient at TT; these regions positively correlate with the Russell Group (RG) of universities.

3.2. Measuring TTO Efficiency

One of us has previously conceptualised a self-assessment tool out of the academic literatures to determine the efficiency of TT [10]. The tool captures the relative presence (5) to absence (0) of several intangible indicators in the areas of: human resources, IP strategy and policy, university-industry links, networks, technology, and organization design and structure. The 'human resources' of the TTO are identify their skill sets, 'IP strategy and policy' focusses on the institutional support given to TT activity, 'university-industry' links indicate the TTO's self-perception of their understanding of the needs of industry, whereas 'networks' indicate the extent of actual interaction between the parties involved. 'Technology' emphasizes the importance of the stage of development of the disclosed technology, as well as the academic merit of the discloser and finally 'organization design and structure' looks at the TTO features (e.g. size, age) and surrounding support functions (e.g. presence of a medical school, business school). Using these non-monetary and intangible indicators, the tool calculates an average score for the efficiency of TT which enables the TTO to be associated with a certain level of 'maturity' in a systematic way (See Table 1).

Table 1 Survey data collected from 8 TTOs in the UK

TTO	Human Resources	IP strat. & policy	Uni-Ind Links	Networks	Technology	Org. design & struct.	Maturity level (i.e. TT efficiency)
1 RG	5	4	5	4	2	3	4
2 RG	5	4	5	4	2	5	4
1 OU	3	4	4	5	1	2	3
2 OU	3	3	4	4	3	3	3
3 OU	4	2	4	4	2	3	3
4 OU	3	2	4	4	4	3	3
5 OU	4	4	4	3	3	4	4
6 OU	4	3	3	4	2	3	3
* RG denotes Russell Group Universities				*OU denotes other universities			

The self-assessment tool was converted into an online questionnaire, using ESurveyCreator, and sent to mid-level employees (identified by their job title: technology transfer manager, IP manager, business development manager, engagement manager etc.) at 116 universities in the UK in July 2016. These universities were sent reminders monthly till the deadline of 31 December 2016, in total 20 universities responded. These 20 were approached for a semi-structured interview and eight agreed. The semi-structured interviews enquired about their range and types of activities, the content of their mission statements and their governance relationship with the university.

4. Findings and Discussion

From the interviews, it was identified that mission statements had a combination of three categories: commercialization, impact and relationship-building. These three categories are supported by different activities. Commercialization is supported through IP protection, licencing and spin-off company creation. Impact is supported through research outputs, knowledge transfer, and regional development. Relationship-building is supported through research contracts, specialized consulting to industry and collaboration for development of research. The interviews also allowed us to identify the university's governance and corresponding organization of the TTO into three broad categories: internalised, externalised or hybrid. An internalised structure is when a TTO is viewed equivalently to a department or office within the university, but functions *independently* from other departments. These internal offices have a low degree of autonomy and report at various levels within the university. An externalised structure is where a TTO company is established physically outside of, but wholly owned by, the university. These external offices have a high degree of autonomy, often being governed solely by an external board. The hybrid structure is where the TTO is held internally as a central office, but supported by other offices (marketing, legal etc.) or IP scouts (faculty level technology transfer officers) or both. Due to the variety of offices involved in this hybrid structure, the autonomy of the TTO varies, but most often the central TTO has autonomy over the other offices, but reports internally. These findings are combined with the outcomes of the self-administered questionnaire embodying the assessment of TTO maturity (numbers in bold in the table body) and represented in Table 2. Table 2 shows the emergence of a typology of TTOs: commercially-, impact- and relationship building-oriented TTOs, although given the small numbers, these must be interpreted tentatively.

Table 2 Emerging typology of TTOs

			Mission Statement	
		Commercial	Impact	Relationships
Governance structure	Internal	**3**(OU1)		**3** (OU6)
	Hybrid		**3**(OU2), **3**(OU3), **3**(OU4)	**4** (OU5)
	External	**4** (RG1), **4**(RG2)		

In terms of the TTOs which can be identified through their mission statements to be predominantly commercially oriented, these will also tend to be the most 'mature' in terms of the efficiency of TT. TTOs with a strong commercialisation orientation are likely to be externalised from the main university structure, much like in many US cases. This type of TTO is more likely to be adopted by a research-intensive university. TTOs which can be identified through their mission statements to be more concerned with having broader impact (on society, business and policy makers) will tend to be of moderate maturity i.e. moderately efficient at TT. They are more likely to be working in a hybrid governance structure, where they have moderate degrees of independence, but also work alongside other departments or functional divisions of the university.

We speculate that TTOs whose dominant mission is to commercialise university generated research are expected to have a direct impact on company level innovations and/or productivity or efficiency. One can expect that they are required to work closely with the private sector. This is reflected by the score of 5 in the university-industry linkages for RG1 and RG2 in Table 1 indicating both universities have an excellent understanding of the needs of industry and the related indicator of networks which indicates strong actual interaction with industry, not just understanding their needs. Additionally, these commercially oriented TTOs receive strong institutional support for TT (scores of 4 in Table 1). Commercially oriented TTOs also have high quality human resources to support their activities. In contrast, we speculate TTOs whose dominant mission is to ensure university generated research has impact (and influence), see private industry as only one of many stakeholders and most certainly do not regard it as the most important one. Impact-oriented TTOs are likely to try and influence government, NGOs, charities and society more generally. Indeed, they have strong interactions with stakeholders (indicated by a network score of 4 in Table 1), but their university-industry link scores (relative to the commercially oriented TTOs), are relatively less strong (scores of 4 versus 5 in Table 1). Interestingly, impact-oriented TTOs generally score more highly on 'technology' than commercially-oriented TTOs i.e. place more emphasis on the stage of development of the disclosed technology and the academic merit of the discloser. It may be that non-industry stakeholders have different attitudes to risk and so require technologies to be further down the pathway of development than private companies (quite possibly their own funding is from third parties, like tax-payers, charitable donors rather than from shareholders or retained profits), and also rely more on the academic reputation of the TTO's university as a broader indication of quality, reliability etc. This might explain in part

why our impact oriented TTOs all adopt a hybrid governance relationship with their universities.

5. Conclusions

Our study is at a nascent stage. It is obvious that the sample size is a fundamental weakness of our study and that our findings needs to be interpreted with a good deal of caution. Our intention is to repeat this study with other TTOs across several EU nations thereby building up our sample and robustness of our findings. Nevertheless, that are some potential early lessons emerging for universities in developing nations attempting to establish their own TTOs.

Firstly, a clear mission statement is needed. Universities in developing countries need to decide what the main focus of their TTO will be, and accordingly which TT activities it will pursue. Depending on which activities the TTO undertakes, an appropriate measure of the success at pursuing these activities should be adopted. The Maturity Model [10] allows for the assessment of TTOs with different mission statements.

The second lesson learnt from TTOs in the UK, is that a clear mission statement needs to be paired with and appropriate governance structure for the TTO. As alluded to by the typology of TTOs in Table 2, an external structure enables a TTO with a commercial focus to be successful. Impact focussed TTOs should employ a hybrid structure, as this allows for an integrated and holistic approach to knowledge transfer within the university to strategically impact regional development. It is not possible to comment on relationship oriented TTOs due there being only 2 and each adopted a different governance structure and have different levels of maturity.

We conclude that when universities from developing countries attempt to establish a TTO it needs to consider the maturity of its TT activities and use the factors within this measure to determine if it might successfully adopt a predominantly commercial, impact (or relationship-building) mission. This should be clearly reflected in its mission statement as a signal to potential partners and the university should adopt a governance structure that enables the TTO to fulfil its primary mission.

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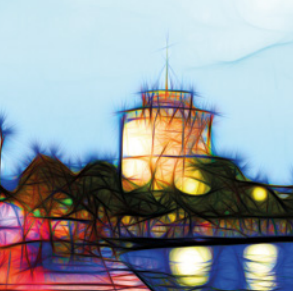

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THE ROLE OF INTELLECTUAL CAPITAL IN MOVING TOWARDS A MORE ENTREPRENEURIAL UNIVERSITY

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The success of the entrepreneurial university is partly determined by the intellectual property (IP) policy. At the university level, the IP policy determines IP ownership, protection systems, royalty distribution, etc. to name a few. It is widely accepted that the IP protection system enhances innovation, which makes an effective IP policy essential for the entrepreneurial university. The effectiveness of the IP policy is often assessed through the benchmarking of tangible assets produced by the technology transfer office (TTO) as a result of knowledge and technology transfer (KTT) activities. However, this method ignores valuable intangible assets which form part of KTT and influence the efficiency of the TTO. The goal of this paper is to assess the effectiveness of the IP policy in a selection of universities to inform policy suggestions and recommendations towards a more entrepreneurial university. This research study will investigate the application of a new method for benchmarking intangible assets of the KTT process. The findings suggest that intangible assets, such as the structural, relational and human capital which make up intellectual capital (IC) have a considerable impact on the efficiency of KTT. Thus, when assessing the effectiveness of the IP policy, IC must be taken into consideration.

Keywords
Entrepreneurial University, Intellectual Capital, Knowledge and Technology Transfer, Technology Transfer Office

1. Introduction

During the end of the 20th century and the beginning of the 21st century, the effects of globalization, the information age (accelerated by the internet) and the knowledge-based economy had significant influences on the ways knowledge is acquired, disseminated and transformed in the global economy. That led to new knowledge production being directly linked to economic competitiveness in terms of national economic growth and welfare creation [1]. In light of this, universities, which are traditionally seen as knowledge producers, had to undergo a second transition by incorporating economic and social development as

part of their third mission [2] which already included technology transfer and innovation, continuing education, and social engagement. These are the emergence universities known as entrepreneurial universities [3]. In achieving this new third mission, entrepreneurial universities have often opted to establish technology transfer offices (TTOs) or similar intermediary unit(s), which actively engage in these third mission activities collectively known as knowledge and technology transfer (KTT). The TTO thus enables the transfer of implicit knowledge, codified or non-codified know-how, and technology to create wealth and to increase economic development [4]. To facilitate this transfer between university and industry, a mechanism was created in the intellectual property (IP) policy which differs between universities. This is since at a national level each country incorporates different standards, structures and incentives into their IP protection acts [5] as well as different IP rights systems (such as patents, design rights, plant breeders' rights etc.). The efficiency of KTT is therefore not just an empirical issue but also a policy issue regarding both the operations and the purposes of universities [6]. As such, the efficiency of KTT is often used to assess the effectiveness of the IP policy at the university level. Operationally, universities persist in efforts to promote KTT, even though a great deal of TTOs operate inefficiently [7]. The inefficiency of the TTO negatively impacts the third mission activities (KTT) entrepreneurial universities engage in. Generally, the efficiency of KTT is assessed through benchmarking of tangible assets such as disclosures, patents, licenses and spin-out companies [8]. However, research has shown that these often-used metrics have little to do with overall performance [9]. Thus, a new tool was created to assess the efficiency of KTT through intangible indicators [10]. Framed in the above premises, this study seeks to assess the effectiveness of the IP policy in entrepreneurial universities, through benchmarking of intangible assets from TTOs which form part of the KTT process. This data will inform policy suggestions and recommendations toward a more entrepreneurial university.

2. Literature Review

2.1 The Performance of Entrepreneurial Universities

There have been various attempts in the literature to articulate the exact definition of an 'entrepreneurial university', but there is, no consensus. A definition has been comprised out of compiling key aspects from relevant authors in the field [2] which states that an entrepreneurial university is a natural incubator, providing support structures for researchers and students to initiate new ventures: intellectual, commercial and conjoint. As such, universities that strive to be more entrepreneurial, are characterized by the transformation of their organizational structures to better respond and adapt to the external environment, are oriented toward innovation and the development of an entrepreneurial culture, and have a new managerial ethos in governance, leadership, and planning [11]. Even though a single definition of an entrepreneurial university is lacking, several criteria for assessing such an organization exist. These include involvement in large-scale science projects, contracted research, consulting, patenting/licensing, generation of spin-off companies, external teaching, university-industry collaboration, as well as new product development and distribution [12]. Given the lack of consensus on the definition of an entrepreneurial university, there is a significant gap in the university sector in both, the measurement of entrepreneurial activities

within the university, as well as the reporting and disclosure of measures to the university's external environment. Moving from this gap recent research [13] has suggested using intellectual capital (IC) as a tool for measuring the performance of entrepreneurial universities. Within the university, the set of intangible and knowledge assets that drive the mechanisms of value creation, are known as IC [5]. Therefore, the suggestion of utilizing IC in this manner is framed in three main arguments; (i) IC represents the main mission and performance of the entrepreneurial university, (ii) the identification of IC which can improve the value creation process results in a higher degree of competition moving the university towards being more entrepreneurial, and (iii) to ensure successful university-industry cooperation transparency is needed, and IC is already widely adopted by industry in assessing performance [13]. Furthermore, depending on the university's profile, mission and vision the weight, role, and meaning of IC will differ which makes it the perfect tool to assess the level of entrepreneurial activity in the university [14].

2.2 Intellectual Property (IP) Policy and the Technology Transfer Office (TTO)

Initially, with the establishment of national IP protection acts and laws in the United States of America (USA), United Kingdom (UK) and other European countries, universities adopted a licensing model in its KTT activities. This model utilizes TTOs to internally manage research contracts, assist in the IP strategy and protection, as well as assisting in IP or technology transfer (e.g. licensing) between the university and industry [15]. The similarities between the tangible assets produced by the TTO during the KTT process, and the criteria for assessing the entrepreneurial universities discussed in section 2.1, are apparent. As such, we can postulate that an efficient TTO leads to a more entrepreneurial university. However, hand-in-hand with the establishment of national IP protection acts and TTOs, was the creation of the university level IP policy as a mechanism to facilitate KTT. A clear and transparent IP policy is important in fostering relations with businesses, as provisions on revenue sharing are a key element of most IP policies. Other elements include rules and guidelines for the commercial exploitation of IP, ensuring that discoveries and inventions are used to benefit the public, defining the responsibilities, rights, and obligations of all parties concerned and, develop basic guidelines for management of the IP policy [16]. Seeing as the IP policy is the mechanism which facilitates KTT, it is assessed by the tangible assets created by the TTO.

As such we can postulate that an effective IP policy leads to an efficient TTO and therefore to a more entrepreneurial university.

2.3 Knowledge and Technology Transfer Efficiency

The efficiency of KTT is usually measured as a ratio of conversion from inputs (such as income, patent budget, and staff) to outputs (such as invention disclosures, patents, licenses and spin-out companies). A survey on TTOs in the USA found that over 50% lose money on KTT operations, only 16% are self-sustaining, and that fewer than 10% of USA universities' KTT are primarily motivated by financial return. Across Europe, a similar trend was observed as just 10% of TTOs secure 80% of all licensing deals, and the top 2% of TTOs across 6 countries capture 40% of licensing revenue [17]. These data evidence the inefficiency of TTOs. However, research shows that patenting is only a small part of KTT and its

measurability and while patenting and licensing have been widely explored in the literature, their de facto status of representing KTT is an example of bounded rationality [18]. Bounded rationality is the theory that there is only so much information that humans can be aware of, and therefore the need for further research on a wider range of potential performance measures is apparent. Based on this evidence, a new tool was created to assess the efficiency of KTT [10] moving from intangible assets or more collectively, IC. IC can furthermore be divided, based on the tripartite classification of IC, into three categories namely human capital, structural or organizational capital, and relational capital [19]. As such this new tool [10] assesses the efficiency of KTT by considering 24 indicators within these three categories of IC, and measures access to human capital (HC), structural capital (SC) and relational capital (RC). Research shows [13] that the entrepreneurial university will focus on personnel with an entrepreneurial mindset and involved in business oriented activities (HC), and the creation of spin-off (SC) and partnership agreements with the private sector (RC). Given that these three key activities are to some extent measured by the new tool [10] we postulate that this tool will give insights into the level of entrepreneurial activity in the university.

3. Methodology

3.1 Research Context

There is an abundance of publications benchmarking the performance of entrepreneurial universities within the USA [6] [17] with numerous rankings and indexes typically citing the ivy league universities as the benchmark. The problem with emulating the Silicon Valley or other ivy league universities is that their economic, political and cultural context are not necessarily applicable to other developed and developing countries. In Europe, the European Commission has fostered the concept of Smart Specialization focusing on universities as key actors of economic and cultural growth in the modern knowledge society [13], which makes the European (including the UK) context more aligned with the goal of this paper. The five participant universities differ from each other in several aspects; country status (developed vs developing), IP ownership regimes (professor's privilege vs university-owned), university status (public vs charity), and the KTT mission (commercial vs impact vs relationship). These aspects are highlighted in Table 1. The countries in which these universities are based also differ from each other in terms of their ranking on the Global Innovation Index (GII), which aims to capture the multi-dimensional facets of innovation.

Table 1 Characteristics of participant universities

University	Country status	University status	IP ownership	Mission
Bath (3rd)	Developed	Charity	University-owned	Relationships
Salento (29th)	Developed	Public	University-owned	Impact
Stellenbosch (54th)	Developing	Public	University-owned	Commercial
Tartu (24th)	Developed	Public	University-owned	Relationships
Uppsala (2nd)	Developed	Public	Professor's privilege	Impact

The ranking of each country for 2016 is given in brackets behind the university name in Table 1.The goal of this paper is to assess the effectiveness of the IP policy in countries with a well-established history of KTT to inform policy suggestions and recommendations towards a more entrepreneurial university for countries where this is a fairly new development.

3.2 Data Collection and Analysis

The five entrepreneurial universities who participated in this study, tasked their TTOs with a self-assessment of the efficiency of KTT using the new tool [10]. The 24 indicators were assessed based on the level of access that the TTO has to the IC defined therein. These 24 indicators are listed in Table 2 along with the relevant category of IC. The indicators highlighted in bold are those corresponding to the three key activities of the entrepreneurial university as discussed in section 2.3. The indicators in Table 2 were scored on a 5 point Likert scale, and then weighted as per the tool [20], and a final score calculated for each TTO. These scores indicate the access the TTO has to IC which influences the efficiency of KTT, and may, therefore, be seen as an indication of efficiency. The efficiency scores, furthermore, translate to one of seven maturity levels ranging from awareness stage to sustained stage [20].

Table 2 Intellectual capital indicators used to assess the efficiency of KTT

Intellectual Capital Category	Indicator
Human Capital (5)	Number of staff
	Staff experience
	Staff expertise
	Readiness level of disclosed technologies
	Academic merit of disclosers
Structural Capital (13)	Mission statement
	Faculty involvement
	Royalty shares for faculty
	Incentives for faculty to disclose
	Sufficient resource allocation to TTO
	Incentives for TTO staff
	Faculty education on IP
	TTO age
	University ownership
	Medical school
	Business incubator
	TTO governance structure
	TTO organizational design
Relational Capital (6)	Faculty relationships
	Faculty networking
	Networking events
	TTO understands the needs of industry
	Industry networking
	Industry education on KTT

4. Findings and Discussion

The overall efficiency scores of the five participant universities' TTOs, along with their corresponding maturity level are given in Table 3, and they are organized from most to least efficient. The maturity levels range from early managed stage, to late managed stage, to early integrated stage. At the managed stage (early or late) the TTO is characterized as pro-actively managing its KTT activities, rather than reactively as seen in the earlier stages of awareness and defined. At the integrated stage (early or late) the TTO is wholly integrated into the university at all levels receiving support in both policy and resources, and on its way to the final stage of efficient KTT activity, the sustainable stage. Given the high GII scores of Sweden (2) and the UK (3), it was expected that universities in these countries would be more successful at third mission activities, as reflected in the high efficiency scores.

Table 3 The efficiency of KTT at five entrepreneurial universities

University	Efficiency Score	Maturity level
Uppsala	63.62	Early Integrated stage
Tartu	57.89	Early Integrated stage
Bath	50.06	Late Managed stage
Stellenbosch	50.09	Late Managed stage
Salento	40.67	Early Managed stage

The level of access to the eight IC indicators highlighted in bold in Table 2 is given in a separate table as a score of 1 to 5 (Table 4). These scores are unweighted, and based on the literature evidence [13] these indicators were selected to serve as a suggestion as to which university is more entrepreneurial as based on the self-assessment of the TTO. The universities are again organized from highest (left) to lowest (right) score. Final scores for each university is given in the final row, and again, as anticipated Uppsala university had the highest score.

Table 4 The level of access that participant universities have to key intellectual capital

IC indicator	Uppsala	Tartu	Stellenbosch	Bath	Salento
Staff experience	5	4	1	4	2
Staff expertise	5	4	5	4	3
Faculty involvement	5	4	4	3	3
Sufficient resource allocation to TTO	3	2	2	1	2
Faculty education on IP	3	3	4	1	4
Business incubator	5	4	5	4	2
Networking events	4	4	4	4	3
Industry networking	5	4	2	5	4
Total	**35**	**29**	**27**	**26**	**23**

The first postulation of this paper is that an efficient TTO leads to a more entrepreneurial university. This is evidenced by the high level of efficient KTT at Uppsala university (Table 3)

which can also be considered as a highly entrepreneurial university (Table 4). Measuring the third mission activities of entrepreneurial universities has not been covered well in literature because the definitions of indicators for measuring third mission performance remains problematic [13]. However, the indicators for measuring the efficiency of KTT are well researched and covered in the literature, as evidenced by this new tool [10]. Therefore, by viewing the efficiency of the TTO is this new holistic manner, the performance of entrepreneurial universities can, to some extent, be determined. The second postulation of this paper is that an effective IP policy leads to an efficient TTO and therefore to a more entrepreneurial university and conversely, thus, an efficient TTO would have an effective IP policy. However, as evidenced in Table 2, the aspects of IC which influence the efficiency of the TTO are not all addressed by the IP policy. Furthermore, the key IC aspects that enables a university to be more entrepreneurial are not all addressed. The IP policy mainly focusses on; the mission for technology transfer, faculty involvement in KTT, royalty shares and incentives for faculty, resource allocation and incentives for the TTO, and faculty education to overcome informational and cultural barriers. Therefore, for the IP policy to be effective, as evidenced by Table 4, it should incorporate IC. We finally postulated that this new tool would give insights into the level of entrepreneurial activity in the university. The results in Table 4 shows this to some extent. As the literature and research on entrepreneurial universities, activities, and indicators for measurement of performance expands, this tool can be built upon. The limitations of this study are the small sample size of universities to test our postulations, the small number of IC indicators to measure the level of entrepreneurial activity in universities, and the absence of traditional benchmarking to make our findings more robust. However, this study provides preliminary evidence which shows that IC can be used to assess entrepreneurial activity in universities, that an efficient TTO is key to the success of KTT and therefore the entrepreneurial university activities, and that the current standard IP policy needs to be revisited.

5. Conclusion and Policy Recommendations

This paper opens up a new perspective on KTT performances of entrepreneurial universities that compliments the established benchmarking of tangible assets along with all its limitations and shortcomings. Within the entrepreneurial university, the benefits of implementing and leveraging IC can be divided into two categories. The first pertains to the potential of IC to function as a management tool to help develop and allocate resources, create strategy, monitor the development of the university's results, and facilitate decision-making. This enables the university to be more flexible and adaptive to the external environment. The second relates to the potential of IC to function as a communication and reporting tool linking the institution to stakeholders and as a way to attract financial, human and technological resources. Thereby enabling the transparency needed to foster business relations, and enhancing the function of the IP policy. Based on this dual nature of IC, and as evidenced by the preliminary findings of this study, IC should be incorporated into existing IP policies. In fact, it is recommended that IP policies are enhanced in scope to include IC and become an all-encompassing IC policy instead.

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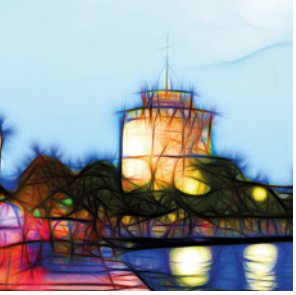

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INNOVATION POLICY IN RUSSIA AND PACE OF UNIVERSITY-INDUSTRY LINKAGES DEVELOPMENT

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All the major science and innovation-activity indicators for Russia remained largely unchanged over the last 10-15 years. Expenditures on R&D (research and development) stay at a low level, with 70 % of the funding provided by the federal government and business investments being stagnantly small. During the last 7 years, the Russian government introduced a number of instruments to improve research performance and stimulate closer cooperation between universities and companies. We present results of the survey conducted in 2016 among 155 medium-size technological companies with the purpose to define factors encouraging and hampering collaboration with universities in Russia. The results show that state of cooperation between companies and universities is somewhat stable but insufficient. It is not low, especially in the area of educational activities but it is not evidently growing. Companies often prefer to conduct R&D by themselves without outsourcing tasks to universities. Major problems companies face in their attempt to partner with universities in R&D include 1) low level of mutual understanding when research projects are conducted; 2) not satisfactory level of training of graduate students; 3) lack of capabilities from side of universities to solve concrete scientific-technical problem in short period of time.

Keywords

Cooperation between Companies and Universities, Innovation Policy, Research and Development, Russia

1. Introduction: Historical Overview of Policy Instruments

The focus of Russian innovation policy kept changing abruptly during post-Soviet period. In the early 1990-s, the government concentrated on the creation of technical infrastructure, such as technology parks and incubators. From the mid-2000-s, the emphasis shifted to the establishment of various financial institutions aimed at supporting technological innovations. In the beginning of the 2010-s, the government realized that horizontal linkages in the innovation system are missing and readjusted its focus to mechanisms for stimulating and strengthening the cooperation between universities and industry. Among the most significant measures introduced in 2010 are technology platforms, programs for innovative development of large state companies, and matching grants for industry-university research cooperation.

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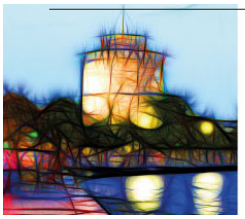
Technology platforms represent a non-financial tool for connecting major actors of an innovation system (industry, research institutes, universities) with an overall goal of developing promising commercially viable technologies. These platforms create a so-called “communication ground” by helping all the parties involved to identify and negotiate promising joint projects. The idea of technology platforms has been adapted from the European Union experience. A total of 35 platforms were established in Russia of which, by 2016, only about 20% were functioning. The major reason for such a modest outcome has been the inability of these platforms to connect different stakeholders. The platform members had low stimuli for cooperation [1]. The government, in turn, did not provide any financial assistance to organizations that served as platform coordinators. In 2012, the government started a program to support 25 competitively selected innovative clusters that combined industrial companies, research institutes, and universities according to their regional proximity, assuming implicitly that this proximity will facilitate the cooperation; however, the goal of fostering the linkages between industry and universities has not been clearly identified.

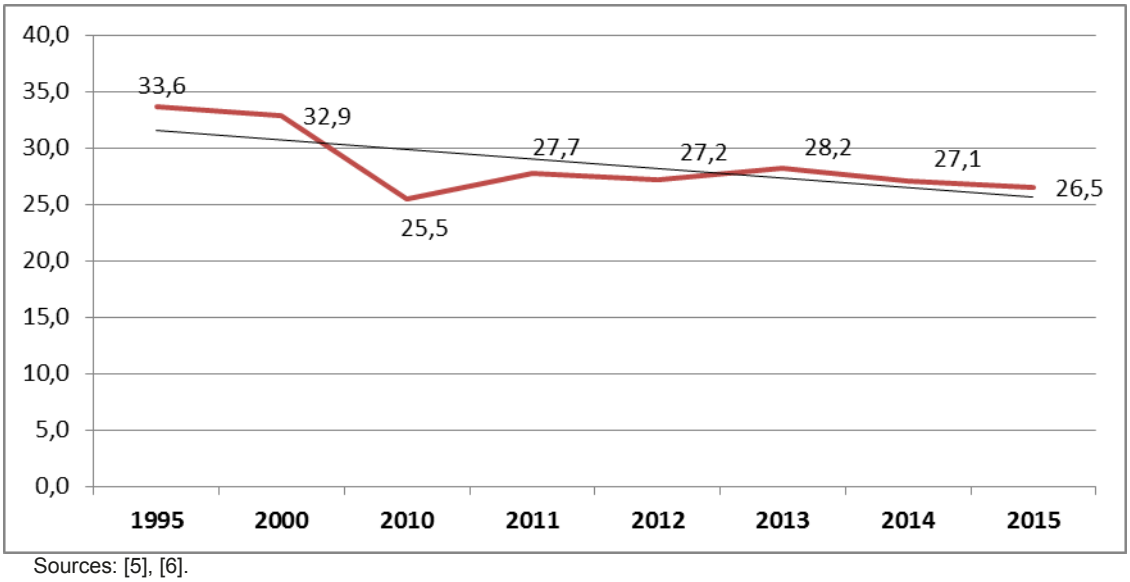
Another new-for-Russia instrument for promoting links between industry and universities was in the form of subsidies distributed competitively to industrial enterprises to fund complex high-tech projects performed together with universities [2]. This was the first policy mechanism conceptually similar to matching grants that are used by governments in many other countries to support corporate research and development. The impact of this instrument was assessed in 2012-2013 using a number of face-to-face interviews with the university and company project leaders. The assessment showed that these companies and universities are in a positive conflict while working together. Some of this friction was related to the typical differences in mentalities and values for businessmen and scientists. These issues, however, have not led to the termination of projects [3] and mutual understanding improved as the projects kept progressing. The survey revealed the following positive effects of the matching grants:

- increased commitment of university research teams to solve scientific and technological problems of companies and strengthened motivation of university researchers to cooperate, especially among younger scientists;
- improvement of student training due to their involvement in research projects;
- modernization of educational programs in line with industrial needs;
- expansion of research cooperation, formation of consortia that included a company and several universities.

The “Program for innovative development of large state companies” was aiming to encourage innovations in large state companies. The companies participating in this program had to set their plans for innovative development, increase R&D (research and development) expenditures, and improve their technological base. After 4 years of functioning, the first evaluation of this program was conducted [4]. It demonstrated that the majority of companies preferred incremental innovations, 69% of them conducted R&D that could be regarded as original only within that company, and only 34% stated that they have undertaken R&D novel on the market scale. Overall the program was declared as partially successful. As the companies were *forced* to cooperate with universities, partially outsourcing their R&D, without having a genuine need for doing so, the cooperation in many ways was too formal, and did not strengthen the industry-university linkages.



Thus, at least three out of four abovementioned measures have been ineffective in improving the cooperation between industry and universities. One major reason for this problem is in the absence of an environment requiring the industry to innovate that would motivate companies to work with universities. Overall, the R&D investments of industry in Russia are still insignificant and keep diminishing over time (figure 1).



Sources: [5], [6].

Figure 1 Business Enterprise Expenditures on R&D in Russia (% of total expenditures on R&D).

2. Pace of Interaction between Companies and Universities

2.1 Level of Innovative Activity and New Policy Instruments

The most common indicator reflecting the status of an innovative system is expenditures on R&D as a percentage of a gross domestic product (GDP). For Russia, this indicator is just over 1%, compared to 2.03% in 1990 [7], before the breakup of the Soviet Union. Currently, these expenditures exhibit a negative dynamics, decreasing from 1.19% in 2014 to 1.13% in 2015; furthermore, budget cuts that started in 2014 are likely to continue this unfortunate trend. For comparison, in technologically developed countries, the expenditures on R&D vary from 4.21% (Israel) to 1.65% (UK) [5].

However, a total volume of funding per se does not appear to be the biggest problem. Russia is distinct in another feature – a very low level of business enterprise expenditures on R&D (BERD). The government budget allocations represent about 70% of the total expenditures on R&D, whereas in developed countries, the partitioning of government and BERD shares is almost the opposite. In fact, in Russia, “pure” BERD are even lower – the combined direct and indirect government support for the business R&D in Russia is 62%, compared to 27 % in

France, 15 % in USA, and 4 % in Germany [8]. These data indicate that Russian S&T area is highly dependent on federal funding and, even in the private sector, technological innovations are mostly government-supported. Since the government funding of R&D is rather modest in absolute terms, companies prefer to purchase new technologies (typically abroad) rather than develop their own. This leads to technological dependence of the country. This may be confirmed by the patent statistics. The number of patent applications in Russia is a factor of 20.5 lower than in China, 14 in the U.S., and 1.5 in Germany. Additionally, a share of patents with foreign applicants among all the patent applications in Russia is only 35% [6]. This suggests that many of these applications are coming from foreign companies located in Russia, rather than from domestic businesses – i.e. foreign manufactures protect their innovations in Russia.

The latest (2016) Global Innovation Index confirms that patenting and production of innovative products and technologies are weak in Russia. According to this Index, the Russian innovation system persistently suffers from low levels of investments and weak linkages among its actors [9].

Slow development of the innovation system raised the necessity to reconsider and reconfigure state innovation policy. This resulted in the announcement by the President Putin, in the end of 2014, of the "National Technology Initiative" (NTI). The core goal of NTI is to enter promising Net-markets by the year 2035 with the intermediate goal of developing new technologies related to forecasted markets within the next 3 years. The expectation is that in 10-20 years these markets will be over 100 billion USD, and Russia may occupy its "niche" there. To reach the goal, the government suggests a policy mix: a support of R&D as implemented by consortia of universities and companies, educational activities (starting from secondary schools), *etc*. Despite such an ambitious goal, so far budgetary allocations have remained rather modest, at least for 2017-2019 they are planned at the level of 130-200 million USD annually [10].

NTI was started in 2015 and by March 2017 twelve promising markets were identified - AutoNet, AeroNet, MariNet, FoodNet, HealthNet, NeuroNet, EnergyNet, FinnNet, SafeNet, MediaNet, and TechNet (aimed at the development of advanced manufacturing technologies); 6 roadmaps have already been approved by the government. The number of "promising markets" is constantly growing. At the moment, there is a discussion about expanding the targeted group to include the AR&VR (augmented reality & virtual reality) market.

In the context of NTI more attention is given to companies that hold a potential of becoming technological leaders at least on the national scale. As a result, the most recent instrument in the government innovation policy is focused on medium-size fast growing technological companies. Historically, in post-Soviet Russia, those medium-size companies that survived and continued developing, have been relying mostly on their own resources. This segment in the Russian innovation system is not large, but the pace of development for these companies is rather impressive. Some of them show 20% growth of annual gains. In order to help these businesses to grow even faster and turn into transnational companies, the government started a pilot program called "Support of private high-tech companies-leaders till 2020" ("National Champions"). It is modeled as many other Russian initiatives after a foreign experience. The approach is to provide individual support to companies (mostly in non-monetary forms, such as assistance with linking to existing policy instruments; informational support and consulting; simplifying export procedures). The program will be considered a success if by year 2020:

- Volume of export will grow by a factor of 4 at least in 15 companies,

- At least 2 companies will have an annual volume of sales equal to 1 billion USD or higher,
- No less than 10 companies will have an annual volume of sales equal to at least 500 million USD [11].

Companies that are program participants were selected on a competitive basis in the end of 2016 and 30 winners were announced. In light of this initiative, an important question is how the medium-size companies implement R&D, and whether they have a real need for cooperating with universities.

2.2 Survey of Fast-Growing Medium-Size Technological Companies

In 2016, Skolkovo Institute of Science and Technology commissioned a survey of medium-size technological companies aimed at the analysis of intensity, directions, forms, problems and prospects of their cooperation with higher-education institutions. Data from the 155 questionnaires complimented by the 15 deep interviews of the companies' leaderships were collected and analyzed. Based on previous surveys of industrial interactions with universities in Russia and abroad, four major hypotheses were developed. It was presumed that companies

1. see universities mainly as workforce suppliers;
2. prefer to cooperate with those universities/teams that they have traditional linkages with;
3. mostly conduct their R&D in house;
4. believe that the government should facilitate the university-industry cooperation via the mainly financial instruments.

The survey has confirmed all these hypotheses. The investigated companies indeed prefer to cooperate with universities for hiring their best graduates. 63% of the respondents interact with universities by participating in the training of students using the company's equipment. 44% organize joint events (conferences, seminars, student contests, etc.), and 43% send their specialists to universities to assist with training students (table 1).

Table 1 Universities as Suppliers of Workforce for Technological Companies (top-5 types of joint activities)

Type of activity	**% of respondents (to the total surveyed)**
Training of students in a company	63
Joint events with universities (conferences, seminars, competitions)	44
Training of students in university by company specialists	43
University conducts R&D for company	35
University professors conduct R&D for company as individual contractors	25

At the same time, the companies are most satisfied with the results of joint research projects, not with educational activities, and prefer to conduct research with their alma mater universities. Moreover, in such collaborations, the companies are often willing to settle for lesser outcomes but deal with those universities that they have long-term relationships with.

During the last 5 years, 80% of the surveyed companies have collaborated with universities on joint R&D projects on rather narrow subjects. These companies are prepared to invest moderate funds in exploratory research conducted by university specialists (including graduate students) but such contracts are irregular. Overall, "open innovations" are unpopular among the companies, which prefer to implement their own in-house R&D. The major reason for the industry's reluctance to outsource research is the companies' low opinion of the quality of universities' research and teaching staff. This is why companies feel more comfortable about universities which their personnel are closely familiar with (e.g. alma mater schools). The main factors that influence the decision of a company to cooperate with a university is linked to the latter's level of competence. The three major factors (in the order of decreasing importance) are

- level of training in the area of company's specialization;
- qualifications of teaching and research staff;
- personal acquaintances with the university's leadership.

Companies were also asked about their preferred policy instruments that the government should use to facilitate the industry-university cooperation. Almost all of these measures represent variations of financial instruments. 76% think that the government should fund joint R&D projects. Two other popular instruments are related to support of personnel or students: 59% of respondents think that the government should co-fund fresh university graduates hired by a company and 56% - that the government should support fellowships for students trained by industry. Only 8% of the surveyed companies consider the government support to be unessential for their plans to interact with universities.

Despite a number of problems, 89% of the companies plan to continue or expand their cooperation with universities, mainly in an educational area (training students) and by hiring a given university graduates. Two areas of the growing industry's interest towards universities were identified: 40% of the companies (versus current 29%) plan to bring university professors for consulting, whereas 31% (versus current 22%) plan to conduct joint R&D projects for third parties. At the same time, only a few companies plan to outsource their R&D to universities.

3. Conclusions

The analysis of the current state of the innovation policy in Russia shows that despite a high level of government activities and introduction of a policy mix, the well-functioning innovation system is still absent. Russian innovation system is mostly government-supported and regulated. While federal funding has grown, BERD remain stagnant and businesses are still expecting the government to fund their R&D activities.

In the area of business-university interactions, the government has applied several instruments, both financial and communicational, in order to facilitate the development of horizontal linkages. However, due to the vertically-organized innovation system, in which both companies and universities are seeking federal support, these instruments were ineffective for boosting the

cooperation. The most promising instrument is thought to be the one of matching grants that companies receive for outsourcing their R&D to universities.

A new government program “National Champions” is focused on individual support of medium-size fast growing firms that have potential to become transnational. The current and potential participants of this program were surveyed in 2016 in order to define whether (i) they are interested in interactions with universities, (ii) have plans to start or expand their cooperation and (iii) if so, in what forms.

The findings from the survey show that companies are mainly interacting with universities in the educational sphere while the results that they are most satisfied with are related to the joint scientific research. A major impediment for wider R&D cooperation is seen in inadequate qualifications of the universities’ staff. Companies tend to favor traditional linkages established with universities from which the companies’ leadership has graduated.

Despite some problems, the majority of the surveyed companies plan to expand their cooperation with higher educational institutes, first of all in the consulting and joint R&D projects. . These companies believe that the government may help with facilitating university-industry cooperation by using financial instruments aimed at easing the burden of funding joint R&D activities and educational training.

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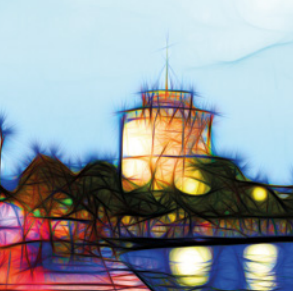

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AN EMPIRICAL STUDY ON THE RELATIONSHIP BETWEEN THE SERVICE QUALITY AND THE CUSTOMERS' SATISFACTION IN THE GREEK HOSPITALITY INDUSTRY: THE CASE OF THE SMES HOTELS

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Providing and maintaining consumer satisfaction constitutes one of the major challenges in the contemporary services industries. Service quality and consumers' satisfaction identify as key factors that can predict consumer behavior and increase business economic results and profitability. In addition, the overwhelming consumer demand for high quality products and services is increasing importantly in the hospitality industry due to the high competition. Researches have shown that high quality products and services increase hotels' corporate image and offer to them a differentiate position in the competitive market. The purpose of the research is to investigate the factors that affect consumers' satisfaction by the Greek SMEs hotels. The data collection is based on a quantitative approach and the type of survey is online. The data is collected via structured online questionnaires and descriptive statistics, correlation and regression analysis was used. The results showed that there is a strong relationship between the service quality and the consumers' satisfaction and, in specific, that the consumers are generally satisfied by the service quality provided by the Greek hotels.

Keywords
Consumer Satisfaction, Correlation Statistics, Hospitality Industry, Regression Analysis

1. Introduction

Providing and maintaining consumer satisfaction constitutes one of the major challenges in the contemporary services industries. Service quality and consumers' satisfaction identify as key factors that can predict consumer behavior and increase business economic results and profitability. In addition, the overwhelming consumer demand for high quality products and services is increasing importantly in the hospitality industry due to the high competition. Many researchers have investigated service quality in the hospitality industry [1],[2],[3],[4]. Most of

them agreed that the service quality have a direct impact both on hotels' competitiveness and economic efficiency. Researchers [3] also have shown that the service quality in the hotels affects directly hotels' competitiveness and indirectly their occupancy. Service quality is a way to manage consumers' satisfaction on all levels and thus increase competitiveness, effectiveness and flexibility of the company. This is because consumers' satisfaction depends on how they perceive the service delivery. Studies [2],[3] have shown that the perceived quality is defined decisively by consumers' expectations. Additionally, other studies have shown that service quality has a significant impact on consumers' satisfaction proving that the two concepts go hands by hand. Thus, it is important to examine the impact that service quality has on the consumer satisfaction by focusing on the factors that defines both concepts [2],[3]. According to the bibliography there are many models to measure consumer satisfaction and service quality in the hotels,but the most popular of all are SERVQUAL, HOLSERV and LODGING QUALITY INDEX and in this research the SERVQUAL tool has been used.

2. Literature review

2.1 Consumer satisfaction

Customer satisfaction has been a popular marketing concept since 1965. During this period, [5] conducted an initial study which focused on consumers' expectations and satisfaction. Consumer satisfaction is defined by [6] as an evaluation or judgment that arises after the consumption of a product or a service. The study of the consumer satisfaction in the hospitality industry, it is very important and as researchers [7] have stated the consumer satisfaction has a direct and indirect impact on business results. More specifically, [7] concluded that consumer satisfaction affects positively business profitability. In addition, the aforementioned researchers argue that both the consumer satisfaction and the service quality are of considerable importance for the businesses as they are necessary for gaining competitive advantage and retain consumers [7]. Further, consumer satisfaction plays a vital role in the hospitality industry and tourism marketing because it is a variable that defines consumers' intention to return to a destination. According to [8] hotels' service quality is an important variable that can predict consumer satisfaction and intention to visit the same destination in the future.
[4] conducted a research in order to measure the consumer satisfaction in the Greek hospitality industry, concluded that the main factors which can predict consumers' satisfaction from the hotels are the general facilities and convenience, the food and beverage quality, the sleep and food quality, the room amenities, the cleaning services and facilities, the safety and the personnel quality. The research findings shown that the visitors were very satisfied with the cleaning services and facilities that the Thasos hotels have, while the other areas need improvement. [9] and [10] found a positive relationship between consumers' satisfaction and employees' behavior in the hotel industry. More specifically, the researchers concluded that the way that employees behave to the consumers during their staying at the hotel, plays an important role to their satisfaction. In the employees' behavior the following parameters are included such as: politeness, employees' appearance, complaints' handling [9]. The impact of employees' behavior in consumers' satisfaction has been also highlighted by more recent researchers. Table 1 presents the research consumer satisfaction factors.

Table 1 Factors of consumers' satisfaction

Factor	Definition	References
Employees' behavior	Employees' behavior is defined as employees' reaction to a particular situation in the workplace.	[9]
General facilities and convenience	The food and beverage quality, the sleep and food quality, the room amenities, the cleaning services and facilities, the safety and the personnel quality.	[4]
Relations-Relationship marketing	The relationship marketing focuses on the relationships that businesses develop with their consumers and as a theory it finds fertile ground in the servicing industry.	[11]

2.2 Service Quality

Service quality is a comparison of expectations with performance [12]. The most known model in the international literature that developed based on the expectation-confirmation theory is the gap model. This model developed by [13],[14],[15] as a model for measuring service quality. According to this model the service quality can be measured by identifying the gaps that exist between the consumers' expectations about a service and their actual perceptions about the service's performance. According to [14] there are five factors that determine perceived service quality in the hospitality industry. Despite the fact that the SERVQUAL model has been criticized by many researchers, it is considered as a reliable instrument that it is used to measure the service quality in the hospitality industry. The SERVQUAL model proves that despite the existence of reasons that urge the consumers to visit initially a hotel, there are factors that create a satisfactory experience to the consumers directed hotel stuff and quality management. SERVQUAL model developed in a period during which intense competition and deregulation lead many businesses, which operated in the retail and the service industry, to differentiate them by the competition and to establish a distinguished market position. Initially, [13] defined service quality by taking under consideration 10 dimensions. But later revised their model and defined service quality based on five dimensions— reliability, responsiveness, assurance, empathy, and tangibles.

2.2.1 Factors of the service quality

2.2.2 Reliability

Reliability refers to the capabilities that a service provider has to fulfill promised services on time and accurately.[16] indicated that the reliability factor is very important as it indicates how consumers' perceive service delivery [16]. In addition, [17] found a positive correlation between trust and consumer loyalty. Thus building relationships that based on confidence play an important role in the perceived quality services. Trust is the element which attaches consumers to the company and makes them feel that they can rely on the provided services. In the same line [18] concluded that consumer trust and consumers' loyalty are the driving factor in the relationship marketing strategies that aims to cultivate long-lasting consumer relations.

2.2.3 Responsiveness

Responsiveness refers to the employees' willing to help the consumers and to respond accurately and politely to their requests. Employees' responsiveness is a crucial factor that affects service quality as in the service industry consumption and production occur at the same time. According to [19] the service failure happens not only due the interaction between the employees and the consumers but also due to the low quality of the tangible elements.

2.2.4 Assurance

Assurance involves employees' courtesy, understanding, skills and knowledge. When assurance is delivering through the services, consumers feel secure and safe during their transactions and their staying in a hotel. Employees' skills, knowledge and experience form the concept of the quality assurance in the hospitality industry, which is essential for clients in order to feel safe and satisfied [13]. According to [20] job training and employees' development constitute important features that can lead to a major quality assurance in the hospitality industry. In addition, the researchers support that job training enable employees to diagnose and correct daily problems that are related to their job. This provides them with greater understanding of consumers' needs and greater responsibility when providing their services. Thus, hotels which pursuit to achieve high quality, it is necessary to manage employees' cooperation and commitment to quality [20].

2.2.5 Empathy

Empathy is a concept which refers to the overall caring individualized service that is given to the consumers.The individualized care in the hospitality industry is a concept that it is related to the employees' behavior. Taking into consideration the high interaction that is existed between employees and consumers at hotels, it can be concluded that service encounters are of great importance to consumers' loyalty and satisfaction. More specifically, employees are the first people that consumers come in touch when entering a hotel thus every single employee can affect consumers' perceptions about the hotel's service quality. According to [21] this is because consumers tend to associate the service provider with the service itself.

2.2.6 Tangibility

Tangibility, as the name indicates refers to all tangible things that a service provides (the facilities, the personnel etc.). Such things are: the facilities, the equipment, the stuff appearance and the written materials. Tangibles constitute the visible aspects of the services that consumers can see and touch. According to [22] tangibility consists of employees' suits, cleanliness of the restaurant and the dining room and the up to date parking facilities. [23] have found that there is a positive correlation between tangible and intangible characteristics of the hospitality services. Those researchers argue that the tangible characteristics of the hospitality industry are the following: the general atmosphere, the food and beverage quality, the design of the rooms, the prices and the general cleanliness. In their research they found that the tangible characteristics

of the hotels are more important to the visitors compared to the intangible characteristics. Table 2 illustrates the SERVQUAL factors.

Table 2 Service Quality factors

Factor	Definition	References
Reliability	Ability to perform the promised service dependably and accurately	[15]
Responsiveness	Willingness to help customers and provide prompt service	[15]
Assurance	Employees' knowledge and courtesy and their ability to inspire trust and confidence	[15]
Empathy	Empathy is a concept which refers to the overall caring individualized service that is given to the consumers	[15]
Tangibility	Appearance of physical facilities, equipment, personnel and written materials	[15]

2.3 Service quality and consumers' satisfaction

Quality of services constitutes one of the most important factors of the consumer satisfaction. Scholars [25],[24],[13],[14] have identified that service quality has a strong correlation with consumer satisfaction and loyalty. In addition, service quality has a direct impact on the hotels economic results such as market shares and total revenues. This is because the satisfied consumers tend to be converted into loyal consumers who make repetitive visits to a hotel or a tourism destination [26].
[27] research shown that service quality has a direct impact on consumers' behavioral intentions. More specifically, the research, which conducted in 205 visitors of Greek hotels, shown that service quality dimensions have a strong correlation with the visitors' word of mouth behaviors and purchased intentions. [27] concluded that service quality is the key factor for the hotels competitive differentiation and consumers' retention.
In this point, it is important to take a look on consumers' satisfaction based on the service quality in the Greek hotel industry. According to ReviewPro's Global Review Index (GRI) released by the Greek Tourism Confederation (SETE) the overall consumers' satisfaction in Greece was 80% in May 2015. More specifically, based on the results of the research, which conducted on 12,649 customer reviews at Greek hotels and 103,007 at rival destinations, shown that the overall consumers' satisfaction for accommodation in Greece was much higher compared to competitive destinations. The same happens with the consumers' satisfaction for food and drink. In addition, the research shown that the Greek destinations with the higher consumer satisfaction were Santorini, Mykonos, Kyclades and Creta. Despite the positive results of SETE's survey some academic researchers have shown that the Greek hotel industry needs further improvement as regards the providing service quality. For example, [4] shown that Greek hotel consumers are not satisfied at all levels of the providing service quality in the Greek hotels. More specifically, the results of the research shown that the hotel consumers had a high satisfaction as regards the hotel services and facilities but they were not generally satisfied by the other factors of the services as indicated the SERVQUEL model [4].

3. Methodology

The research method that it is used is the quantitative research and the basic tool that is used to collect the data from the sample is the structured questionnaire. The sample consists men and women who have visited Greek hotels during the last two years. The sample of the research will be N=70. The following tables 3, 4,5 and 6 present the descriptive statistics, regression statistics, correlation statistics and reliability statistics respectively.

Table 3 Descriptive statistics

		Statistics	
Particioant characteristics	**Age**	25-34: 18.6%	45-54: 30.0%
		35-44: 51.4%	
	Sex	Male: 54.3%	Female: 45.7%
	Education	Postgraduate: 52.8%	Undergraduate: 41.5%
			High school: 5.7%
	Marital status	Single: 47.1%	Married: 52.9%
	Household income	<35,000: 25.7%	>50,000: 28.6%
		35.000-49.999: 45.7%	
	Previous staying in the same hotel	Yes: 68.6%	No: 31.4%
	Days staying in the hotel	<4: 5.7%	5: 41.4%
		4: 35.7%	>5: 17.1%
	Ethnicity	European: 61.4%	Other: 22.9%
			Asian: 15.7%

Note: Sample size, N=70

Table 4 Regression Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,728	,529	,494	,295

a. Predictors: (Constant), SERVQUAL

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	,515	1	,515	2,215	,000
	Residual	15,827	68	,233		
	Total	16,343	69			

a. Dependent Variable: SATISFACTION
b. Predictors: (Constant), SERVQUAL

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	3,851	,526		4,474	,000
	SERVQUAL	,564	,074	,873	7,324	,000

a. Dependent Variable: SATISFACTION

Table 5 Correlations

		SERVQUAL	SATISFACTION
SERVQUAL	Pearson Correlation	1	
	Sig. (2-tailed)		
	N	70	
SATISFACTION	Pearson Correlation	,846	1
	Sig. (2-tailed)	,846	
	N	70	70

Table 6 Reliability analysis

		Reliability Statistics	
SERVQUAL	**Tangibles**	Cronbach α score	0.745
	Reliability	Cronbach α score	0.642
	Responsiveness	Cronbach α score	0.668
	Assurance	Cronbach α score	0.700
	Empathy	Cronbach α score	0.812
	Guests' satisfaction	Cronbach α score	0.846

Note: Sample size, N=70

4. Conclusions

The results of our research revealed that the consumers are generally satisfied by the services provided by the Greek hotels. More specifically, the mean of the guests' satisfaction scale is 4,6. In addition, our research revealed that there is a correlation between the service quality and the consumers' satisfaction. The regression analysis confirmed the research question H1: The perceived service quality provided to hotel guest is significantly related to guest's satisfaction.

The results show that there is a strong relationship between the service quality and the consumers' satisfaction. In addition, the results of our research shown that the consumers are generally satisfied by the service quality provided by the Greek hotels. Also the research results are confirmed by the international literature [2], [3]. Service quality and consumers satisfaction are two concepts that go hand by hand and the relationship between them are very close. We examined five dimensions— reliability, responsiveness, assurance, empathy, and tangibles. The research shows that all of the aforementioned factors play an important role in the consumers' satisfaction. More specifically, the mean valued of guests' satisfaction was 4,6286. This means that the quests are generally satisfied by the hotels' service quality. In this point, it is important to take a look at the mean value of the five dimensions of the SERVQUAL model. More specifically, reliability and tangibility had the higher mean value. The other three dimensions (assurance, responsiveness and empathy) had a lower but still good mean value. This means that the clients find Greek hotels very good due to their reliability and tangibility assets. The results of the research have many similarities with the results of [4] research who found that Thaso's hotel visitors were very satisfied with the cleaning services and facilities that the Thasos hotels have, while the other areas need improvement.

The role of tangibility in the consumers' satisfaction has been also highlighted by other researchers such as [23] who explain that the tangible characteristics of the hospitality industry

(the general atmosphere, the food and beverage quality, the design of the rooms, the prices and the general cleanliness) are more important to the visitors compared to the intangible characteristics. Thus they suggested that hotels should pay attention to such characteristics, if they want to increase consumers' satisfaction. This is because tangible characteristics affect subconsciously the consumers' perceptions about the hotels' service quality. Except from the tangibility, reliability plays also an important role to our research as the mean of this parameter was also high. Reliability depends a lot on the employees' behavior. The research showed that employees' behavior and the relationships that they develop with the consumers during their staying at the hotels play also an important role to their satisfaction and perceptions about the service quality. In line with other researches, the consumers' retention and loyalty have been also examined by researchers [27], [28] in the context of service quality and consumers' satisfaction. For example, [27] shown that service quality has a direct impact on consumers' behavioral intentions. More specifically, the research, which conducted in 205 visitors of Greek hotels, shown that service quality dimensions have a strong correlation with the visitors' word of mouth behaviors and purchased intentions. Based on the results of their research [27] concluded that service quality is the key factor for the hotels competitive differentiation and consumers' retention.

4.1 Managerial Implications

Consumers' satisfaction and service quality go hand by hand based on the results to our research. Thus, is important for managers to invest time to improve their service quality. More specifically, they should pay much attention to the hotels' reliability and tangibility as these are the most important factors that affect consumers' satisfaction. Also, managers should use SERVQUAL tool, as it is very helpful, in order to measure consumers' satisfaction and to make necessary changes to the hotels to improve service quality. The SERVQUAL tool can help Greek hotel managers to decide where to put their marketing efforts. By using this tool the hotel managers can target the right consumers and to use appropriate the available human and economic recourses. Based on the results of our research, it is proposed that managers should pay specific attention to the tangibility and reliability dimension of the service quality. These two dimensions had the higher mean value and thus we believe that Greek managers should improve those dimensions if they want to keep the consumers satisfied. In addition, we believe that managers should pay specific attention to the development of close relationships with the clients. Also it is proposed that the Greek hotel managers should invest more on the cultivation of relationships with the employees and the clients. Such relationships will add value to the perceived service quality. Lastly, based on the, it is proposed that the hotel managers should pay attention to the "assurance", "empathy" and "responsiveness" as these three dimensions of the SERVQUAL model had the lowest mean value.

4.2 Research limitations and future research

The sample and the sampling: The sample that we used (N=70 people) is not enough in order to generalize the data in the total population. Except for the small size of the sample our data cannot be generalized due to the sampling method that we chose. Limitations of online surveys: The other limitation of our research is related to the general limitations of the online surveys. The absence of interviewer is the most important of all. We try to come up with this challenge by not

doing open questions and by being as specific as we could. Finally the research topic can be investigated by implementing other service quality assessment tools which can be compared to SERVQUAL.

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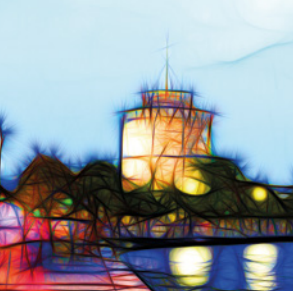

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INSTITUTIONAL CHANGE AND THE TRIPLE HELIX MODEL IN TRANSITION ECONOMIES

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The paper aims to discuss the interrelationship between the state, the institutions, (particularly educational institutions and research centers) and the industry by presenting and outlining a theoretical model. The model is slightly different from the standard Triple Helix model as it reflects on the impact of the processes that characterize transition economies. The research discusses the specificities of transition economies and the need for Triple Helix models in such economies nowadays to enhance institutional change and socio-economic development. The role of the government is envisioned as supporting the required equilibrium in this processes of active interaction. Thus the model is developed as arising from both evolutionary (unintentional) processes as well as from design-based (intentional) processes.

Keywords

Economic Development, Institutional Development, Social Development, Transition Economies, Triple Helix

1. Introduction

The evolution of political and economic institutions is important for the economic performance of transition economies as they determine the framework for all social initiatives. In addition, institutional change has played an important role in the process of encouraging certain actions, while at the same time limiting others [1]. Therefore, it is beneficial to analyze the interrelationship between institutional development and economic development and its contribution to the strengthening and boosting of sustainability and the sustainable development of a given society. This interrelationship is characterized by a number of endogenous and exogenous processes of institutional change, which aim to improve the joint actions of various economic agents, to achieve economic growth and contribute to social progress. Also, it is important to distinguish the role of the state in strengthening such interrelationship. As a policy maker it performs both organizational and coordination functions in the process of interactions between the institutions and the private sector, while at the same time it regulates and provides the necessary financial resource for supporting the processes for exchange of information, knowledge, and skills.

This paper aims to discuss the interrelationship between the state, the institutions, (particularly educational institutions and research centers) and the industry by presenting and outlining a theoretical model. The model is slightly different from the standard Triple Helix model as it reflects on the impact of the processes that characterize transition economies. The role of the government is envisioned as supporting the required equilibrium in this processes of active interaction through its function of a policy maker. Thus the model is developed as arising from

both evolutionary (unintentional) processes as well as from design-based (intentional) processes.

2. Methodology

The analysis has been built by providing a literature review on the concepts of institutional change in transition economies, its specificities and peculiarities. On this basis, through the deductive method of inferring and comparing similarities and complementarities, the analysis establishes links between the most prominent factors which influence positive change in institutional development and effective economic transformations. The paper proposes a new theoretical Triple Helix model, which is particularly applicable to transition economies as a measure to solve long-term socio-economic problems. The model brings together the joint efforts of entrepreneurs, national policy makers and the institutional environment.

3. Institutional change in transition economies – a literature review

Institutional transformation is the essence of transition. In principle, transition economies rely largely on individual incentives. However, as Woo, Sachs and Parker posit, the major problem arises from the fact that markets are very complex structures where most agents in advanced market economies are not individuals but institutions (corporations, unions, banks, pension funds, etc.), and markets themselves are various institutional arrangements. Therefore, the institutions work because they are tied to the existence of other institutions in the same environment, with the interconnections among these systems. Thus, to set the proper direction of transition countries development means not only to eliminate some of the most absurd distortions of the past regime, but also to foster the establishment of institutions of the future. Moreover, institutions are not only interdependent, historically contingent but they are also intimately tied with the state. The state is not only a very powerful player; the boundaries between the state and the non-state actors are constantly contested, redrawn, and redefined. In advanced Western countries the share of state expenses in the gross national product has been reported to range between one-third and one-half (with a few states such as Sweden and Denmark, approaching 60 percent). Yet, this figure does not include the impact of state regulation on the reallocation of resources on the private market. The state in Eastern Europe has not only withdrawn, it's role has significantly shrunk and needs to enter into a new mode of interaction with a balance of power between state and non-state actors [2].
Tridico discerns three distinct phases of the transition process in former communist economies: (1) chaotic, (2) macro stabilization, and (3) consolidation. He stipulates that in the first and third phases in particular, the role of the institutions and of the state is crucial, while this was largely ignored during transition in many CEE (Central and Eastern European) countries. This was largely due to the fact that capitalism is not only a different system of allocating resources but it brings with it a "new style of life" as well. During the transition there is interaction between formal institutions determined by the new system and informal institutions of the "Old Ethos", which are essentially determined by behavior contingent on the past. It is the discrepancy between formal and informal rules that causes an increase in transaction costs and weakens the institutional

framework, thus negatively affecting economic relations and economic performances. Hence, institutions are not exogenously defined and unchangeable, rather they have a social nature and they evolve, slowly but continuously [3].

After the dissolution of the communist bloc in 1989, countries in Eastern and Central Europe began a transformation process towards market economy which significantly changed both the economic and institutional frameworks. Tridico posits that although in the CEE countries there are guarantees of private property, new banks, new economic and administrative organizations, and other formal institutions exogenously imposed in a short time and by political decision, the behavioral rules have not completely changed. Informal economic institutions are far from completed because economic agents often continue to think in terms of a previous economic logic and inertia toward new behavioral models.

The main factors that hinder institutional development and hence economic growth are lobbies, the practice of corruption and the presence of free-riders. Tridico [3] further asserts that old institutions may continue to function in the new system even if they are inefficient because current institutions are contingent on the past. Some prominent examples of the pressure and resistance on the institutional framework he provides are:

- Opposition to the change from retired people, bureaucrats, part of the former communist ruling class who are unwilling to accept the new rules of a market economy;
- Resistance of farmers and heavy-industry workers to formal change and restructuring of agriculture and heavy industry as a result of the need for harmonization with the Agriculture Common Policy and with the EU internal market rules;
- Significant increase in regional divergence between poor and rich regions and between big cities and villages or small towns. This divergence increased during the 1990s, and the dichotomy is between winners and losers in the transition process, where the losers of the transition try to resist the change.
- Cumbersome bureaucracy, which is not yet well adapted to the new formal institutions of a market economy. Bureaucrats and civil servants come from an old planned economy structure, and in most cases, they are not used to the new concerns of the market economy.

Hence, Tridico [3] provides examples of problematic interaction between informal rules and the new formal ones, which need to be solved in order to enhance institutional development in transition economies. These are:

- Significant presence of a gray or black market opposed to a legal market, in many cases tolerated by governments
- Uncertainty and instability of prices whose costs, in many cases, do not depend on competition and input costs but on special bargaining, relationships, bribing costs, social customs, habits, etc;
- Emergence of oligarchs, oil-and-resource-seeking groups, new and old bureaucrats, ruling classes able to rob the country, sell it abroad, and take advantage of institutional chaos;
- Tax evasion and illegal practices (bribing and corruption) in economic transactions by some groups and agents to avoid a lengthy bureaucratic process; to achieve their own aims more easily; to run more efficiently in the new economic contest, avoiding rules and processes not yet well known;

- An informal sphere of institutions negatively affecting economic relations, like illegal groups or entities providing easy credit;
- Lack of trust between foreign and local investors;
- Minimal use of banking and financial services.

One of the major outcomes of this never ending conflict between formal and informal institutions and the dichotomy between old institutional environment and new institutional forms *is the realization that neither the accession to international organizations, such as the Organization for Economic Cooperation and Development (OECD) or NATO, nor membership in the European Union (EU) marks the end of the period.*
In this respect Tridico proposes that institutional change can be pushed ahead by four main drivers: *technology, change in the value structure (informal change), change in the formal sphere (constitutions and law), and sudden great transformation (such as revolution)* [3].
In order to overcome the long-term ineffectiveness of institutions as a result of transition processes, it is necessary to identify the most effective means through which to activate these drivers. It has been widely considered that foreign direct investment (FDI) inflows have had a strong impact on growth and trade as well as on the development of institutions. FDI play a particularly important role for technological development if investment flows from higher developed economies to countries or regions with a lower level of technology and it has had a significant role in enterprise restructuring of transition countries in CEE [4]. On the first place they bring new technology and labor organization in the economy and thus help boost it up. On the other hand, if institutions are able to establish stability and certainty in economic relations, there will be more foreign investments with a positive effect on economic growth. Some studies provide evidence that institutional quality has a positive and significant effect on FDI [5].
These observations bring forward the need for building a model, which combines all factors that will most effectively contribute to the required transformation of institutional forms and will eventually result in institutional development in transition economies. Here we suggest that such factors should originate from the most problematic zones and, what is most significant, they should interact and reinforce each other to create productive solutions and spur economic growth in transition economies. Particularly relevant is the application of such a model in countries with prolonged transition and deeply rooted problems that have incurred ineffectiveness in institutional operations and thus have prevented economic growth and overall social development.

4. The Triple Helix model for institutional change in transition economies

In all cases of transformations that have economic and political ground, socio-economic problems arise, basically related to unemployment, inflation, slowdown in GDP growth, rising poverty levels, increasing number of crimes, etc. And all of these problems are directly and/or indirectly caused by ineffective or dysfunctional institutions. Therefore, in order to overcome such problems, generated from the neglect of institutional development, new models have to be proposed. Such models should be aimed at identifying both endogenous (internal) and

exogenous (external) factors, which bear the potential to contribute to radical reforms of the economic systems in transition.

From the standpoint of a politician viewing an economy that is performing badly and where rates of economic growth and employment levels are low, it is therefore reasonable to advocate enterprise and entrepreneurship if they can be promoted with policy initiatives and the rewards from these exceed the economic costs [6]. In fact, institutions represent both constraining and enabling forces with respect to entrepreneurship in any context. Yet, Smallbone and Welter argue that transition economies represent an appropriate 'laboratory' in which to examine the relationship between institutional change and entrepreneurship, in view of the extent of the change required as these societies move from central planning towards market-based systems. However, in the initial stages of transition, their role is often mainly a constraining one, as the environment is characterized by a high level of uncertainty, associated with rapidly changing external conditions and major institutional deficiencies. Entrepreneurs have contributed to creating a demand for institutional change through the key role they played in the development of the economies in the first decade after the start of transition. However, the process of accession to the EU has contributed to institutional development, driven partly by the need for Accession countries to meet the conditions for entry laid down by the EU, and partly by their desire to have the institutional conditions in place that would enable them to successfully access EU Structural Funds to facilitate economic restructuring. This has affected the institutional structures, including the development of sub-national institutional frameworks (in some countries), policy processes as well as policy itself [7]. Some studies have tried to link measures of entrepreneurial activity to growth, typically startup rates, to economic growth. Other measures include the relative share of small- and medium-sized enterprises (SMEs) and self-employment rates [8].

In this paper we propose that institutional change could be successfully brought about in transition economies through a Triple Helix model, particularly intended to support such processes of prolonged and problematic transition, characterized by slow economic growth. Thus, we limit ourselves to only three contributing factors that provide for institutional change in transition economies. However, these are considered (and proposed here) to be the most prominent drivers of institutional change and economic development, namely – *entrepreneurship, national policy makers, and educational and research institutions.*

Figure 1 The Triple Helix model for transition economies

These three main factors or rather their interrelationship and reinforcement bring a powerful contribution to the process of institutional development. On the first place, entrepreneurship should be considered as bearing the most important role in supporting economies through the transition process, particularly with regard to establishing start-ups and introducing innovations. There are three basic conceptual approaches to entrepreneurship [9]:

The *first is a functional approach* and it refers to dynamic participants, who take up key decisions for investments, production, innovations, location, research and development. From this viewpoint, the process of entrepreneurship is a psychological characteristic that implies dynamics, creativity, and originality. The approach calls for managers from multinational companies, state enterprises and NGOs as well as a variety of dynamic entrepreneurs within the organizations themselves.

The *second approach* is focused on the company as a key economic agent who takes decisions on investments, diversification in new business activities/sectors or moving to other countries.

The *third conceptual approach* is focused on enterprises, managed by their owners. It considers the entrepreneur as an owner and actively engaged in the activity of the enterprise, mainly SMEs.

Smallbone and Welter [7] suggest that institutional change is an integral part of the process of market reform, as an economy adapts from an institutional framework appropriate for centrally planning to that required to facilitate market development. Therefore, institutional change can positively influence entrepreneurship when it removes or lowers barriers to market entry and/or exit, thus creating opportunity fields for entrepreneurs. An example is the introduction of private property rights which occurred in some transition countries at the beginning of the transformation process [7].

In all cases, however, in order for innovations to be actively introduced in the entrepreneurial business units there are two main prerequisites – the financial resource required for the initial investment and the active support of research centers and educational institutions. The financial resource, of course does not only refer to investments in long-term tangible assets but also allows for good liquidity, especially for start-ups. This resource could be owned by the company or it could be borrowed from financial institutions or state subsidies.

Development of innovation and entrepreneurship at local, regional and national levels is an important element of the triple helix model and it can be further enhanced by implementing the concept of smart specialization. By definition, smart specialization has been recognized as an important element of smart growth, which includes businesses, research centers, collaborating institutions, public authorities and local government. The creators of the concept of smart specialization believe that an effective strategy should first focus on discovering entrepreneurship and respective niches. These should serve as the basis of specialization in

assets of knowledge, research and innovation, which are inherent in both the public and private sphere. It is proposed that by choosing a small amount of key areas where there are grounds for specialization, countries and regions can occupy a unique position on the international scene. The choice of economic specialization, using the innovative potential and resources of knowledge and skills should strengthen the competitiveness of the region and translate into faster economic growth. Smart specialization should create and implement enterprise, research centers, collaborating institutions and local public authorities. [10]

The second factor from our model – the status of the national policy makers – also has a decisive role in the process of institutional development. It sets forth the prerequisites which are necessary for implementing and executing state polies in order to implement investments in innovations, to support entrepreneurs, to arrange for the training of entrepreneurs, to set up the legal framework for all initiatives and last but not least to prepare the regulative framework for guaranteeing the stability of the financial system and the development of financial institutions. Smallbone and Welter recognize that institutional changes driven by the state on the supply side of the economy, need to be matched by institutional change on the demand side. They draw attention to the role of entrepreneurship education at different levels as they consider that this is likely to affect the number of potential and nascent entrepreneurs. Entrepreneurship is thus dependent on the drive and commitment of individuals and it can be facilitated by government through an appropriate and effective functioning institutional frame. Yet, the state cannot fully substitute for individual entrepreneurial endeavor [7].

The third factor from the proposed model – the institutional environment – consists mainly of higher educational institutions (universities) and research centers. Universities not only transfer knowledge and do research but they also try to capitalize the knowledge, which they produce and this, by itself, is a new production model [11]. This third element of the Triple Helix model generates a new scheme of institutional structures, which arise from the interrelation between the three helixes. Small, medium, and large companies, universities and other research organizations, local, regional and national governments interact in order to generate new ideas and contribute to innovations, primarily in the industrial sphere. Thus, the interrelation between universities, entrepreneurs and the national policy makers is transformed when the capitalization of academic knowledge replaces the disinterestedness and also the public character of knowledge itself.

4. Conclusions

The results of the study highlight on the impact of the trilateral interrelationship in the process of transforming economies with regard to past, current, and future trends. Although the Triple Helix model is widely discussed in strictly theoretical terms, this study looks at its practical application in a transitional economy context. The results of the study demonstrate that, by identifying the most problematic zones, the model significantly contributes to the process of transforming and strengthening not only the educational institutions but also the engaged public and private agents (entrepreneurs and government authorities). It proves that the strong collaboration between the three parties is of paramount importance for attaining sustainable economic development and social progress.

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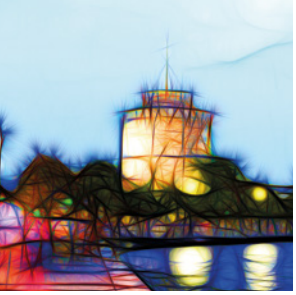

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IMPLEMENTATION OF ERP SYSTEMS TO TURKISH SMES FOR SUSTAINABLE PROFITABILITY

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There is the extensive demand for Information and Communication Technologies (ICTs) and many businesses invest their capital on this emerging branch of the growing technologies. Nevertheless, the adoption of these technologies is not utilized well especially in emerging countries such as Turkey. Enterprise-Resource-Planning (ERP) Systems help Small and medium-sized enterprises (SMEs) to grow rapidly and economically. Some theoretical models have been developed to predict the critical factors for the adoption of technologies in business life such as Unified Theory of Acceptance Use of Technology (UTAUT). This study aims to find the critical factors which can be the determinants of users' technology acceptance and behavioural intentions for using ERP Systems. The data have been provided through questionnaires that are sent to 88 SMEs. The key finding of the current study is that the UTAUT model is applicable in Turkish SMEs. This study advances to apply the novel management model in Turkish SMEs and aims by updating the data sustainable profitability for the SMEs. This study implicates the importance of raising awareness of ERP Systems in Turkey and also contributes to the scientific literature regarding technology acceptance. Most importantly the research reveals practical implications for Turkish SMEs, regional and global economy.

Keywords
ERP Systems, SMEs, Technology Acceptance, UTAUT Model

1. Introduction

There is the extensive demand for Information and Communication Technologies (ICTs), and many businesses invest their capital on this emerging branch of the growing technologies. Nevertheless, the adoption of these technologies is not utilized well especially in emerging countries such as Turkey. Enterprise-Resource-Planning (ERP) Systems help companies and Small and medium-sized enterprises (SMEs) to grow rapidly and economically, but the same technology acceptance problem is also visible for this system. However, some theoretical models have been explored and developed to predict the critical factors for the adoption of technologies in business life such as Unified Theory of Acceptance Use of Technology (UTAUT). ERP system implementation can be summarised into three phases; selection, implementation, and operation [1]. Near the technical implementation stage, users' acceptance is key to the full success of adoption of ERP systems. Therefore, the post-implementation stages are needed for further study.

The aim of this study is to explore and research critical factors affecting the end- users' acceptance of ERP systems. Application of UTAUT model for the analysis of end users' acceptance will be next step after the factors have been identified. Different identified factors will be tested according to their relationship with the UTAUT model to study the user acceptance of ERP system.

- Objectives:
- Review the literature in depth on the use of ICT by SMEs.
- Conduct a survey on SMEs at certain sizes to understand the actual level of ICT use.
- Include questions on Key Performance Indicators (KPIs) such as costs, sales, customer satisfaction, planning, and the use of ICT in the survey.
- Empirically analyse survey data to identify the potential obstacles to ERP use by SMEs.
- Find and discuss the most effective ways of implementation of ERP systems

2. Results

The research is focusing on ERP systems adoption to Turkish SMEs for sustainable profitability. Therefore, the subjects are people using and/or able to use ERP systems in their companies i.e. SMEs. Thus the subjects are mainly CEOs and/or managers of the SMEs. The detailed structure of participants and sampling group can be seen in Appendix C. The purposes of this research method are related to functioning surveys and extensive conversations. It can be assumed that the SMEs case study research is not professional, due to the lack of available sampling issue. In such situations, non-random sampling produces the methodology to present samples, which include peoples' decisions. [2] SMEs managers in the quantitative research samples are ordinate and purposeful. A sample size cannot be operated by any rule on non-profitability sampling, and this issue is uncertain [3].

Specifically, with homogenous sampling, purposive sampling methods have been selected, which is non-probability sampling due to the subjective decisions of the researcher.

The sample size is not so important as in all non-probability sampling techniques. However, it is essential to have a reasonable relationship between research purpose and sample selection techniques. Queries have been prepared both in Turkish and English that they are sent to a department of Istanbul Chamber of Commerce with enough information about the research. Also, the information near the queries has been translated into Turkish. Thus the questionnaires with information and consent forms have been sent to chosen SMEs. So the sampling methods have been provided appropriately according to the literature [4].

The tools such as e-mail or cover letter to identify the research aims can be used to increase the usage probability of self-completed investigations. Other forms to spread these searches can be argued such as internet sites etc. For example, IBM-SPSS, and another web programs can be beneficial to do quantitative data research to reply exalted hypothesis (T-test, ANOVA, Correlations, etc.) In addition to these other statistical programs can be consulted (Reviews, etc.).

The research process is designed, via taking into consideration the aim and questions of the research, as quantitative studies, has a positivist research background, and the approach was deductive in a limited time and budget. Moreover, it is a descriptive study containing a survey with a random homogeneous selection which also considers research ethics, reliability and validity. The surveys were provided in a paper-based format and distributed to each participant on hand, and the data analysis has been supported via IBM SPSS program.

Two standard methods, reasoning the research as inductive and deductive, are mentioned by Saunders [2]. Beginning with the general and terminating with a particular topic is named deduction, whereas inductive approach leads moving from particular to the general. Determining factors, from the analysis of a vast number of hypotheses, is deductive research i.e. a given situation is created on to general theories or concepts [5]. Time limit of the study is another factor that leads the author to choose deductive approach instead of an inductive approach, which needs more time compared to deductive one [6]. Moreover, a deductive approach is also preferred to avoid risks [7].

The queries, collecting data from the end users and literature review will lead us to provide lots of hypotheses about the adoption and implementation of ERP systems in SMEs. Then, the author can suggest the factors could influence the users' acceptance. Thus, more research is needed to be more specific about the research question. Therefore, the deductive analysis is meaningful. The hypotheses can also be tested in a statistically meaningful number of participants that also shows the need for deductive research. Selection samples of sufficient arithmetical size will lead to generalise about the consistencies in human social behaviour [3].

2.1 Survey respondents

The participants' profile is analysed according to gender, marital status, the level of education and age. Males were 88.6% of the participants whereas females comprise 11.4% of respondents (Figure 1). Investigating the marital status ends up with 19.3% married, 77.3% single and 3.4% divorced (Figure 2) people which belong 52.3% to 1-40 age group (considering that minimum age is 25), 34.1% of 41-50 age group, 6,8% to 51-60 age group and 6,8% to 61 and more age group (Figure 3). The participants' level of education is: 18.2% completed high school, 11.4% some college, 5,7% completed college, 42% graduate school, 19.3% graduated degree and 3.4% other (Figure 4).

2.2 Descriptive Statistics

The degree of one individual plan to use ERP systems in the future:

The outcome is between strongly disagree 1 to strongly agree 7. The outcome is between "Moderately likely" and "Much likely" to use ERP with a leaning towards the "Much likely" (mean = 5.7727) (considering the Likert scale: 1 = Very much unlikely, 2 = Much unlikely, 3 = Moderately unlikely, 4 = Neither likely nor unlikely, 5 = Moderately likely, 6 = Much likely, 7 = Very much likely). There is demand for ERP systems but to promote awareness about the significance of ERP systems should be provided (Table 1).

The degree of one individual believes that the company has stable and functionally well ERP systems:

End users believe that their ERP systems stable and functionally well in a moderate manner. Due to the outcome as 5,0795. Although ERP systems have been applied in SMEs, this result shows that there is a need in better adoption ways of especially this branch of IS in the business life. Thus it is worth to discover further the critical factors for implementing the ERP systems for sustainable profitability (Table 2).

Are there any differences between males and females regarding ERP System usage time?

There were 88 participants who took part on this research and all of them replied to the corresponding questions. Big percentage of males (46%) and females (60%) are none users meaning insufficient widening of ERP systems. Pearson Chi-Square is .02 < .05. This means that there is a statistical difference between males and females regarding frequency of using ERP software (Table 3).

Are there any differences between males and females in terms of general questions?

The outcomes indicate that there are not meaningful differences between female ERP users and male ERP users in terms of general questions for ERP usage. (Results are not demonstrated in this paper.)

Are there any age-related differences in terms of ERP usage evaluation?

To have this information is to run the Oneway ANOVA analysis between four questions representing each factor of UTAUT model in the age group. Results show that there are not statistical differences between age groups due to the Sig. Value more than 0.05 (Results are not demonstrated in this paper.)

2.3 Figures

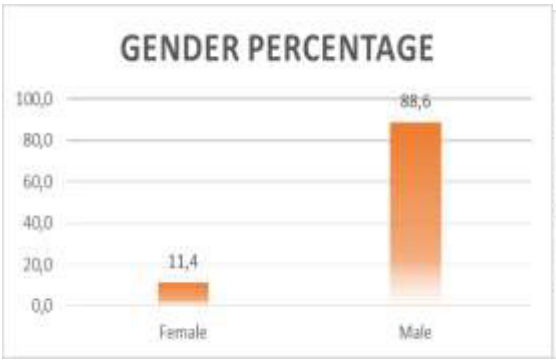

Figure 1 Gender Percentage

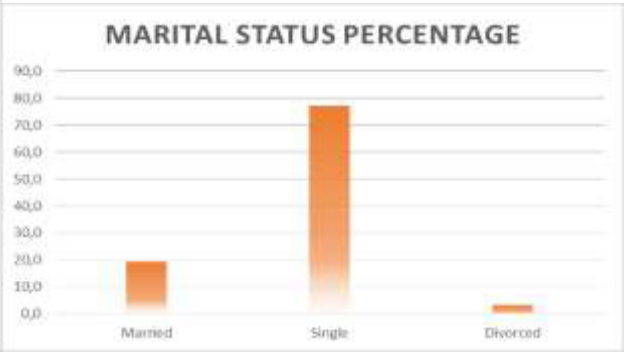

Figure 2 Marital Status Percentage

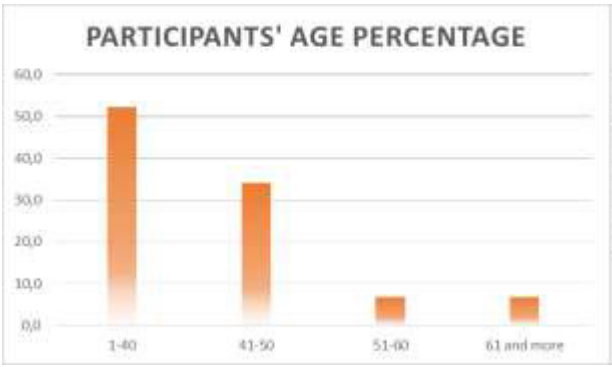

Figure 3 Participants' Age Percentage

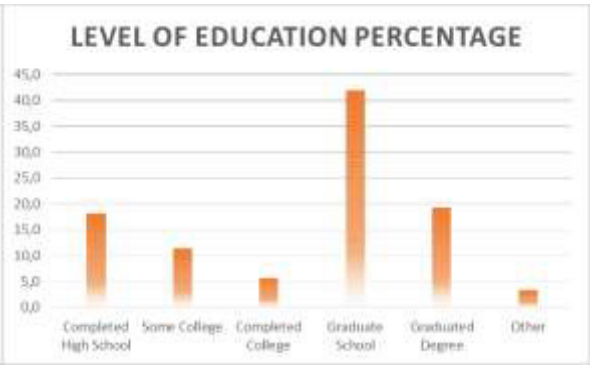

Figure 4 Level of Education Percentage

Table 1: The degree of one individual plan to use ERP systems in the future

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
I plan to use ERP system in the future.	88	2,00	7,00	5,7727	1,29302
Valid N (listwise)	88				

Table 2 The degree of one individual believe that the company has stable and functionally well ERP systems

	N	Minimum	Maximum	Mean	Std. Deviation
I think the ERP system in our company is functionally well and stable	88	1,00	7,00	5,0795	1,11646
Valid N (listwise)	88				

		gq2- For how long have you used ERP system						
		Less than 3 months	3-6 months	1-2 years	2-3 years	More than 3 years	None	Total
gender- 1 Female 2 Male	Female	1	0	1	0	2	6	10
	Male	1	2	12	13	14	36	78
Total		2	2	13	13	16	42	88

Table 3 Are there any differences between males and females in terms of ERP System usage time?

3. Conclusions

The research illustrated that performance expectancy and effort expectancy are the main determinants of user acceptance for ERP systems implementation in SMEs for sustainable profitability. The author recommended for Turkish SMEs based on the results revealed. The study limitations have been taken into account, and new perspectives have been explained for further research. It is highly recommended for future research that the effect of cultural variations should be taken into account, further researchers should focus on inter-disciplinary and longitudinal research more, also the participants should be representing all diverse educational level, different age groups, consequently other technology acceptance models should be also investigated to find out the critical factor influencing user acceptance of ERP systems from SMEs.

This research moderately reinforced the study of Venkatesh et al. [8]. It has been evidently concluded that two aspects (performance expectancy and effort expectancy) are predictors as critical factors of ERP systems implementation i.e. behavioural intention. Though, this research opposes the outcomes proposed by UTAUT includes the strong relation of age and gender and their influence on performance expectancy and end users' acceptance.

Although technology acceptance models have exposed to have lower prognostic authority in emerging countries i.e. outside developed countries, this study evidently proposes that technology acceptance theories can be apparently applied in emerging countries, such as Turkey. This means that the effort, which has been made in developed countries via acceptance theories to retain users, is also applicable in emerging economies. Nevertheless, it should be noted that for the extension of the results to generalise the conclusion further research should be provided to have more acceptable consequences in other branches of the business either.

The results of the study should help Turkish managers in SMEs to discover the acceptance factors of technology in SMEs that affect the users' behaviour. The evidence from this study suggests that performance expectancy is the key element of behavioural intention. It means that the most influencing factor for SMEs is their acuities about the effectivities and interests consequential by using ERP systems. Especially this implicates the significance of raising awareness of ERP system implementation before initiation of the system in SMEs. The most efficient message from this study is to inform customers about the advantages of such systems before implementation of ERP system. To increase adoption is directly related to the informed users about the ways which lead to the improvement of productivity. But it should be noted that diverse groups should be investigated differently.

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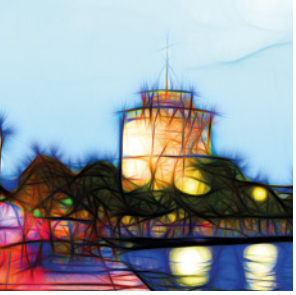

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ONE-SIZE-FITS-NONE: HOW ENTREPRENEURSHIP TRAINING CAN MEET REGIONAL SOCIO-ECONOMIC CONTEXTS

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The paper presents preliminary work on designing an inclusive, regional-sensitive and domain-focused high-tech entrepreneurship training programme[1]. It reviews the existing collaborative startup training initiatives at a global scale, along the views of young University students with an interest in entrepreneurship, startup mentors, local public authorities, and NGOs from four different cities [Thessaloniki (GR), Izmir (TR), Como (IT), Coimbra (PT)]. Through a mixed method approach (desk research for relevant training programmes, online questionnaire for the students, and roundtable discussions for the rest of the stakeholders in the four regions), a complete training needs analysis for entrepreneurial practice is performed, where the participants' views on a level of particular skill-sets and the rest of the stakeholders' strategic aspirations are investigated. The results indicate that both students and related stakeholders identify similar entrepreneurship training gaps centered on opportunity recognition and market validation, teamwork, and flexibility.

Keywords
Digital Entrepreneurship, Entrepreneurial Skills, Entrepreneurship Training, Start-up Training, Tech start-ups

1. Introduction

The growth of tech start-ups is an important investment opportunity and a potential competitive advantage for the EU and beyond. However, equipping young University students with appropriate generic entrepreneurship skills, along with contextual socio-economic regional knowledge is easier said than done. A fragmented European startup ecosystem landscape, a wide set of high-tech business domain peculiarities, varying individual training needs and diverse socio-economic geographical contexts make the task challenging. The current paper focuses on the training need particularities and the challenges associated with designing an entrepreneurship training programme aiming to promote digital entrepreneurship.

[1] Funded by the project "iSTART: A Lean-Training, Innovative, Multidisciplinary Digital Entrepreneurship Platform" (code no. 2016-1-TR01-KA203-034258), funded by the Erasmus+ Programme, Key Action 'Cooperation for innovation and the exchange of good practices', Action 'Strategic Partnerships'

The importance of enterprise education is evident by the initiatives taken by the European Commission. Several policy calls are centered on the promotion of entrepreneurship both in relation to how academic institutions foster entrepreneurship, but also how enterprising graduates progress. A characteristic example is the European Commission's Entrepreneurship 2020 Action Plan which stresses the importance of entrepreneurship education on Europe's return investments [1].

However, the level of contribution of entrepreneurship education in the development of successful entrepreneurial projects is an issue of debate. Under the umbrella of entrepreneurship training, a large variety of courses with different context and content are delivered, the effects of which on students/potential entrepreneurs are difficult to be measured [2]. Nevertheless, there are two theoretical approaches that suggest that entrepreneurship education has at least a positive relation to **entrepreneurial intentions**. The first approach relates to the human capital theory [3] where human capital outcomes, such as entrepreneurship-related knowledge and a positive perception of entrepreneurship and intentions, show a strong positive relationship with entrepreneurship education [4]. The second approach refers to the entrepreneurial self-efficacy approach [5], which suggests that entrepreneurship education enhances entrepreneurial self-efficacy (i.e. having the confidence to perform tasks relevant to entrepreneurship), which in turn increases entrepreneurship intentions. More specifically, students receiving entrepreneurship training become acquainted with success stories of entrepreneurs who explain their strategies of success. In this way, their self-efficacy increases, and as their expectations of success increase, they become more motivated and interested in entrepreneurship [6].

In this respect, the main objectives in the design of an entrepreneurship training programme are two: on the one hand it has to increase entrepreneurship intentions, and on the other it needs to build trainees confidence in terms of their self-efficacy in entrepreneurship. In order to achieve that, a careful curriculum design process needs to take place, based on an analysis of the actual needs of the potential entrepreneurs and all related stakeholders.

Regarding the latter, the current literature on the design of entrepreneurship training programmes seems to highlight the importance of all related stakeholders in the design process. According to Penaluna *et al* (2012) [7], trainees gain more from their training experience when educators incorporate lessons learnt from personal start up experience, and when key stakeholders are involved in the development of curricula. Similarly, it is argued that entrepreneurship courses in higher education need to consider and address the needs of all stakeholders related to entrepreneurship education such as students, entrepreneurship academics and researchers, regional and national governments and all types of businesses [1]. Finally, in a recent study regarding entrepreneurship training in tertiary education, it has been suggested that outreach and engagement with the community and its businesses is essential for the success of entrepreneurship programs of tertiary education institutions [8].

Considering the above, the current paper involves the performance of a complete training needs analysis (TNA) for entrepreneurial practice, where the participants' views on a level of particular skill-sets and the rest of the stakeholders' strategic aspirations are investigated. The current study focuses on four countries (Turkey, Greece, Italy, and Portugal) and its results constitute the preliminary work on designing an inclusive, regional-sensitive and domain-focused high-tech entrepreneurship training programme[2]. The methods and the results of the TNA are presented in the following sections of the paper.

2. Methodology & Sample

The current TNA reviews the existing collaborative startup training initiatives at a global scale, along the views of young University students with an interest in entrepreneurship, startup mentors, local public authorities, and NGOs from four different cities (i.e. Thessaloniki (GR), Izmir (TR), Como (IT), and Coimbra (PT). Through a mixed method approach (e.g. desk research for relevant training programmes, online questionnaire for the students and a semi-structured interview for the rest of the stakeholders in the four regions), the current entrepreneurial training practice, the participants' views on a level of particular skill-sets and the rest of the stakeholders' strategic aspirations are compared and contrasted.

2.1 Desk-based research

The first part of the study for the TNA involved a desk-based research. The aim of the desk-based research was to identify best practice start-up incubators & accelerators around the globe, and examine the type of services and training support they offer. For that reason, the information gathered for each of these cases involved:

- Information for Stakeholders involved (e.g. industry/private incubator, university/research institute, local/national government/EU public funding, societal organizations/NGOs, other)
- Geographic region of activity
- Type of support service (e.g. Training, infrastructure, management consulting, business expertise, IT support, legal advice, etc)
- Business sector(s) focus of service, and
- Brief description of useful facts (e.g. achievements in numbers, training processes, success stories, etc.)

The final sample of the desk-based research was one hundred twenty six (126) cases from twenty one (21) countries. Table 1 includes all recorded cases by country of origin.

[2] Funded by the project "iSTART: A Lean-Training, Innovative, Multidisciplinary Digital Entrepreneurship Platform" (code no. 2016-1-TR01-KA203-034258), funded by the Erasmus+ Programme, Key Action 'Cooperation for innovation and the exchange of good practices', Action 'Strategic Partnerships'

Table 1 Best Practice Start-up Incubators & Accelerators

Country	Cases
Austria	2
Brazil	1
Bulgaria	2
Canada	3
Chile	1
Finland	5
France	39
Germany	3
India	4
Israel	7
Japan	2
Russia	18
Serbia	2
Singapore	2
Spain	3
Sweden	14
Switzerland	5
The Netherlands	4
Tunisia	2
UK	3
USA	4
Total	**126**

2.2 Questionnaire Survey

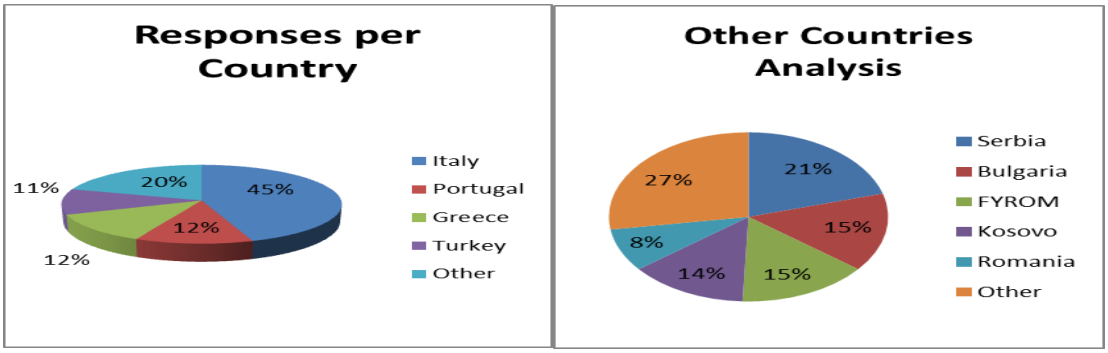
The second part of the TNA involved a questionnaire survey referring to students/potential entrepreneurs. An on line questionnaire was developed using Google Forms and it was distributed by all partners participated in the project (the questionnaire is available in the appendix). Participants were given a list of entrepreneurial skills separated in three categories (managerial/ communication & relational/ personal skills) and were asked to rate each skill on a scale of 1 to 3 as a) being significant to entrepreneurship, b) being personally familiar with?

The three categories of skills included the following skills:

- **Managerial:** opportunity recognition, problem solving, business planning, marketing, financial projections, pitching
- **Communication & Relational:** Communication and Presentation techniques, Team building and team working, Networking techniques, and Collaboration and Empathy
- **Personal:** Creative Thinking, Idea Generation, Flexibility and Stress Management

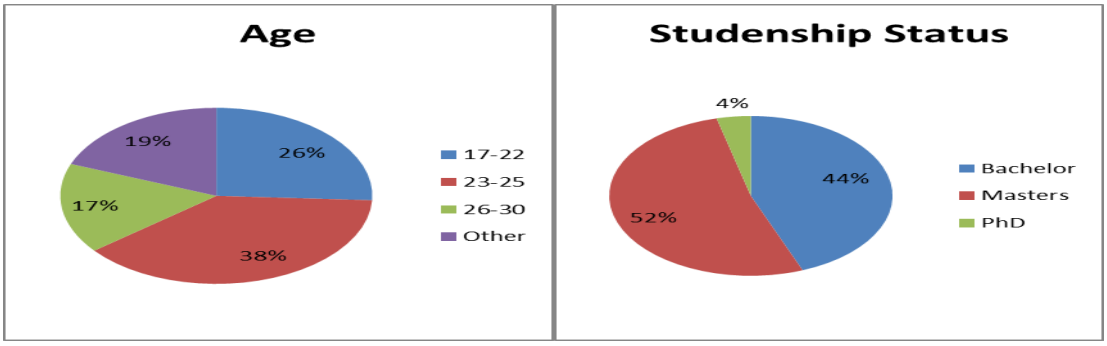
The overall sample consisted of 361 responses from students of different nationality, studentship status, and age. The following graphs depict the demographic data of the sample. As anticipated, the majority of the responses were from the partners' countries of origin (Italy: 161, Portugal: 45, Greece: 44, Turkey: 38), but there was also a considerable number of responses from other countries of the South Eastern Europe such as Serbia, Bulgaria, FYROM, Kosovo, and Romania, mainly due to the involvement of City College in Greece that has students from these areas. Other random responses came from various countries.

Figure 1: Responses per country



In terms of age, the majority of the respondents were mature students over 23 year old, while younger students (17-22) participating in the survey accounted for only 26% of the sample. As the age demographics already indicated, the majority of the students participating in the survey were mature students. Namely, undergraduate students amounted to 44% of the sample, while the majority consisted of master students (52%). There were also a small percentage of PhD students (4%).

Figure 2: Responses per age & studentship status



2.3 Roundtable Discussions

In order to examine quadruple helix stakeholders' perceptions on digital entrepreneurial training needs, roundtable discussions with representatives from academia, business, government, and society were conducted in each participant country (Turkey, Greece, Italy, and Portugal). These roundtable discussions had a coordinator from each partner who guided the discussion based on a semi-structured questionnaire, but the discussion also led to other related issues, as this was the scope of the roundtable discussions. The main questions included in this questionnaire where the following:

- What do you think are the most important managerial, communication and relational, and personal skills in entrepreneurship?
- From those skills, what would you think future entrepreneurs mostly lack?
- Do you think that an on-going collaboration between businesses, academia, government and the society would address those gaps? How?

As table 2 indicates, four roundtable discussions with quadruple helix stakeholders took place, one in each country, with representatives from the local academia, business, government, and society:

Table 2 Roundtable Participants per country

Country	**Participants**
Turkey	9
Greece	14
Italy	12
Portugal	16
Total	**51**

3. Results

The outcomes of the TNA were various since different research methods examined a variety of issues. These results were however synthesized in order to come up with significant conclusions regarding the design of the entrepreneurship training curriculum. The main results are analyzed in the current section, and the final conclusions are formulated in the conclusions part of this paper.

3.1 Desk based research

As mentioned earlier in the sample description, the desk based research resulted in the concentration of 53 cases from all over the world, involving mainly best practice incubators and accelerators. Through an examination of these organizations' stakeholders involved and the type of service support offered, the study reveals the following.

First of all, these organizations place limited emphasis on active University students. The majority of people applying in these organizations are not University students, but people that have usually graduated and are willing to be trained in starting a business. Therefore, it seems that there is an unaddressed 'grey' area between university studies and training in starting a business, as University studies teach 'entrepreneurship', while Incubators/accelerators train actual 'startups'.

Secondly, incubators and accelerators usually focus on investment-ready ideas and solid teams. That practice excludes people that don't have a ready formulated idea or a team. In other words, 'Startup for starters' training seems to be missing.

Finally, the training provided by these organizations is usually long-term, as it involves weeks or even months of training. As such, people that cannot commit so much time, but still want to learn the basics of startups cannot participate. Thus, the existence of short and intensive training could address the needs of these people.

3.2 Questionnaire Survey (Students)

The main aim of the questionnaire survey on students potentially becoming entrepreneurs was to examine students' perceptions on which skills are important for entrepreneurship, and from those skills, what was their level of familiarity. Regarding **managerial skills,** students identify Opportunity Recognition and Problem Solving as the most significant managerial skills, while Marketing and Financial Projections are ranked relatively low. Even in the case of skills that they consider necessary however, their level of familiarity is low. A similar trend was identified in the results of **the communicational and relational skills.** Overall, with the exception of Collaboration and Empathy skills where the percentages between the level of significance and the level of familiarity are relatively close, there exists a gap between what respondents think is important and what they actually acquire. The skills that appear to more significant compared to other communicational and relational skills are Team Building and Team Working skills; Networking techniques were ranked second in importance according to

respondents but in the same time they were the least ranked in terms of familiarity. A similar trend is identified when examining the results for **Personal skills.** Personal skills seem to be ranked relatively higher than communicational and relational skills by the respondents in terms of necessity for entrepreneurship, but again the comparative scores on level of familiarity are low.

By summarizing all results regardless of the categorization of skills, interesting findings emerge concerning entrepreneurship training needs at least based on students' perspectives. Table 3 ranks all skills included in the questionnaire survey in terms of their necessity for entrepreneurship. The corresponding levels of familiarity are also provided. As the table indicates, students value Opportunity Recognition and Problem Solving highly, while Creative Thinking, Team building and Teamwork are also considered highly important. Nevertheless, the respective levels of familiarity are low; therefore it is clear that there **is a gap between what skills are essential for entrepreneurship and what students actually have**.

Table 3 Summary of all Skills

Skills	Necessary for Entrepreneurship (%)	High Level of Familiarity (%)
Opportunity Recognition	79,2	28,8
Problem Solving	78,9	50,4
Creative Thinking	75,3	46,3
Team building & Teamwork	75,1	57,6
Business Planning	72,6	33,8
Idea Generation	72,6	57,6
Networking Techniques	68,7	33,5
Flexibility	68,4	33,5
Communication/Presentation Techniques	68,1	44,6
Collaboration& Empathy	65,1	57,9
Stress Management & Resilience	63,7	57,9
Financial Projections	59,3	25,2
Marketing	56,8	32,7

3.3 Roundtable Discussion (Stakeholders)

The results of the roundtable discussions that took place in the four cities (Thessaloniki, Izmir, Como, Coimbra) were synthesized and the main outcomes involve: 1. Stakeholders 'suggestions regarding skills, and 2. Stakeholders' suggestions regarding On going Collaboration.

Training Needs
Although a great number of skills were recognized by stakeholders as essential for entrepreneurship, what was really interesting was the identification of the basic skills young entrepreneurs usually lack based on the various stakeholders' experiences. Thus, one major outcome of the roundtable discussions with the stakeholders was their suggestions regarding skills that potential entrepreneurs need to be trained on.

Firstly, according to the stakeholders, due to the gap between an interesting idea and commercial success, future entrepreneurs must be trained on opportunity recognition skills (understand the needs of the market) as well as on market validation skills (effectively communicate an idea to the market, know how to pitch).

Secondly, stakeholders emphasize teamwork and team building as essential skills that usually young entrepreneurs lack. They argue that potential entrepreneurs must realize the importance of skill complementarity in a team context, that they should be able to know oneself (i.e. personal skills, strengths, weaknesses, etc.) in the process of building a team, and that they should be open, share ideas, and show empathy.

Finally, stakeholders argued that potential entrepreneurs should be flexible and resilient. It is essential that they perceive technological and market trends quickly and that they appropriate them into commercial solutions and offerings. It is also essential that they will be trained on alternative scenario development.

Ongoing Collaboration

Regarding stakeholders' input on whether an on-going collaboration between businesses, academia, government, and the society would address those gaps, stakeholders' suggestions are summarized as follows.

One of their suggestions is that academia and the business world should enhance networking practices. This way, they will increase the accessibility of all stakeholders by entrepreneurs. Another key suggestion is that the business world should try to provide the commercial validation to academia. One way for this to happen is having the business word offering issues or problems to be solved by academia. In this case, however, each stakeholder's unique role must be preserved. A final suggestion involved the promotion of entrepreneurial activity by academics, where the availability of research funding for the effective transformation of a research idea to commercial success, was identified as an essential success factor.

4. Conclusions

The majority of current entrepreneurial training is delivered as academic and organizational courses, highly focused startup training in incubators or as generic public sector initiatives. Nevertheless, as the current paper suggests, there is also the need to provide entrepreneurship training to potential entrepreneurs that don't have investment ready ideas or haven't formulated solid teams. And since most training support provided by incubators and accelerators is long term, there is also a need to provide shorter training programmes.

Towards the design of the curricula for such training programs, and given the literature suggestions on the importance of all related stakeholders in the design process, the results of the current TNA may prove to be very beneficial towards that direction. The comparison between students' and all related stakeholders' (academia, business, government, society) perceptions on the potential gaps in entrepreneurship training, gave quite similar results. On the one hand University students identified certain gaps between what skills they believe are important and their personal skill-level. These mainly involved skills such as opportunity recognition, problem solving, creative thinking, and team building/teamwork. Stakeholders' views were also in accordance with the majority of the findings of the students' survey. They emphasized opportunity recognition skills, team working skills, and personal skills such as flexibility and resilience.

Considering the results of this TNA, a dynamic, bespoke, and pan-European entrepreneurship training curriculum will be developed under the scope of the iStart project, which will address the 'one-size-fits-none' entrepreneurship training process. This training program will leave room for local and tailor-made startup training services. Such a structure is not only entrepreneurial in itself, by allowing creative pivots of the training arrangements, a necessary element of any entrepreneurial practice, but more importantly it is increasingly relevant with our socio-economic conditions and our post-industrial age of doing business.

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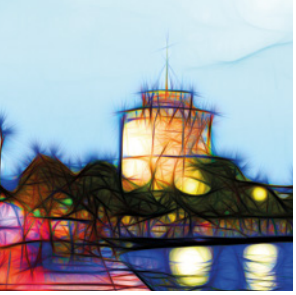

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CO – CREATING INNOVATIVE CONCEPTS TO ADDRESS CRUCIAL TRENDS AND CHALLENGES THAT PUBLIC TRANSPORT FACES IN THESSALONIKI

E. Genitsaris[1], A. Roukouni[1], A. Stamelou[1], D. Nalmpantis[1], A. Naniopoulos[1]

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During the past decades, there is a growing perception that citizens should be given the chance to participate in decision - making processes regarding policies that will greatly affect their everyday lives, in order to ensure the promotion of fair and effective policies. The objective of the present paper is to explore co – creating innovative concepts that could be used to address critical trends and challenges that public transport faces. This is achieved by presenting the case of a co – creation workshop that has taken place in 2016 in Thessaloniki, Greece. This workshop took place in the context of CIPTEC (Collective Innovation for Public Transport in European Cities), an EU Horizon 2020 project. The outcome of the workshop indicated that the integration of co-creation (participatory planning) methods in the process of developing solutions, services, systems and strategic plans in the fields of public transport and sustainable mobility, through a methodologically structured way, could help the relevant stakeholders by supporting decision making and meeting the needs of travelers in a more effective way.

Keywords
Co – Creation, Innovation, Participatory Planning, Public Transport, Workshop

1. Introduction

During the past decades, there is a growing perception that citizens should be given the chance to participate in decision - making processes regarding policies that will greatly affect their everyday lives, in order to ensure the promotion of fair and effective policies; in addition to that, participation lies at the core of the democracy concept [1], [2], [3], especially in regard to handling multi-dimensional issues, such as sustainable mobility [4]. The importance of citizens' involvement has initially emerged in the '70s, after the United Nations Conference on the Human Environment in Stockholm (1972), in which the critical role of citizens in reducing and eliminating environmental problems was highlighted. This was based on the very negative impact on the environment of many policies, which, at that time focused merely on achieving economic growth, often disregarding the environmental aspect. Until nowadays,

many more international initiatives have taken place aiming at enhancing citizens' participation in decision making [5]. The participatory design and planning has been mainly implemented in the field of urban planning and design.
Nevertheless, it should be taken into account that there is a number of critical urban studies which claim that participation could be potentially considered as a technology of power, as it can be used to produce consensus for decisions already taken and that the state influence does not axiomatically decrease in cases in which many actors are involved in the decision making process [6]; manipulation and distorting of the results might still occur. Moreover, issues of representation may arise, due to the fact that citizens more willing to participate tend to belong to the middle and upper class and are usually well educated [7]. However, it can be claimed that this depends significantly on the motives of the body that initiates a participatory process. So, it can be expected that it is of the private sector's high interest to implement co-creation processes in an objective and neutral way in order to receive useful and substantial feedback from the consumer base, before exposing itself in the market risks of real business.
Despite its wide implementation in the field of urban planning, the expansion of participatory planning in the fields of transport, especially in public transport sector, was, until recently, limited. In recent years, the design is coming to the forefront again, by following a more client-centered approach and emphasizing on services, business models and innovation. Innovation is defined as 'the implementation of a new or significantly improved product, or process, a new marketing method, or a new organisational method in business practice, workplace organisation or external relations' [8]. With a focus on public transport, the term of innovation can be described as 'every idea coming from other fields, and it is currently not applied in public transport or even any idea that, while it has been conceived and may already been implemented in some areas of the world, it has not been yet spread or adopted in a certain local or/and national context' [9].
The objective of the present paper is to explore co – creating innovative concepts that could be used to address critical trends and challenges that public transport faces. This is achieved by presenting the case of a co – creation workshop that has taken place in 2016 in Thessaloniki, Greece. This workshop took place in the context of CIPTEC. CIPTEC (Collective Innovation for Public Transport in European Cities) is an EU Horizon 2020 project, addressing the challenge for "Smart, Green and Integrated Transport" and a CIVITAS knowledge generating project in the area of "Tackling urban congestion". The project started in May 2015 and will run for 36 months. The CIPTEC Consortium is composed of 12 partners of various types, scope and mission, representing 7 different European countries (Germany, France, United Kingdom, Italy, the Netherlands, Belgium and Greece). The project consortium includes as partners, Universities, Authorities and private companies (consultancies and one operator), embodying this way somehow the Triple Helix concept by representing the fields of Academia, Governance and Industry [10]. The Transport Systems Research Group of the Aristotle University of Thessaloniki, Greece (TSRG/AUTh) is the project co-ordinator partner.
CIPTEC uses an integrated approach which attempts to combine ideas from marketing (customer orientation, marketing research, consumer intelligence), consumer behaviour (advanced motivational research, behavioural experimentation), innovation (crowdsourcing, collective intelligence, co-creation and co-design of new ideas, fusion of business concepts

with social innovation), evaluation (socioeconomic, technological and ethical assessment) and co-exploitation within a wide stakeholder platform attacking the challenges that do not favour the growth of public transport share.
Since Spring 2016, CIPTEC has been exploring the 'unknown' through the co-creation of new emerging ideas that might spark new solutions in the field of urban transport by a bottom-up approach. In this context, new, innovative solutions were suggested and evaluated with the aid of eight co-creation workshops which were organized between May and December 2016 in four urban areas – Thessaloniki, Southern Tuscany, Rotterdam and Frankfurt. The overall scope of CIPTEC co-creation workshops was to generate innovative concepts, both services and products that could build on public transport and contribute to its attractiveness and market share.
The remainder of the paper is structured as follows: the case study is presented and analysed in Section 2. Initially, the preparatory actions that took place in order to ensure the successful implementation of the workshop are briefly stated, followed by the description of the actual workshop implementation. After that, the main findings of the workshop are displayed and discussed in Section 3. The paper concludes in Section 4, with a critical overall analysis of the results.

2. Case analysis

2.1 Workshop preparation

The co – creation workshop which is the focus of the present paper took place in Thessaloniki, on December 9th, 2016. The title of the workshop was "*Crucial Trends and Challenges which Public Transport is facing. Answers given by formulating innovative ideas"*, and its objective was to mobilize the "innovative thinking" of participants through a participatory planning process, in order to use the 'collective intelligence' of the public to explore creative solutions to tackle identified problems. Regarding the workshop participants, an attempt was made to invite people with diverse background and who vary in age, profession, educational level etc. Totally, 32 persons participated in the workshop and worked together for 5 hours (16:00 – 21:00) to co – shape innovative ways to improve public transport in Thessaloniki.
The invitation process began one month prior to the workshop by creating a list with potential participants, representatives of Research Institutes, Local Authorities, Public Transport Providers and Public Transport Authorities, Businesses, and Universities. They were both experts and non-experts on Public Transport issues and some of them were members of specific citizen groups, for instance people with disabilities, as well as people with interesting backgrounds, not necessarily transport – related. The potential participants were contacted personally by phone and in case they accepted the invitation, the "warm-up material", was sent to them. This material included useful information about the workshop's process, the definition/interpretation of the term "innovation" and some representative examples of it, as well as communication guidelines for this kind of interactive events, for those who were not familiar with them [11].

The success of such type of workshops depends strongly on the diversity and the heterogeneity of the participants. This combination helps the organizers gathering more creative and different approaches. The main aim is to "get the whole system in the room".

2.2 Workshop implementation

At the beginning of the workshop, a short presentation about CIPTEC project and the main trends that characterize the Public Transport sector currently (or are expected to have a great impact on it in years to come) was given. These trends include: the use of innovative technologies, population ageing, sustainable lifestyles, urbanization, urban governance, shared economy etc. [12].
Participants were divided into different groups and four teams were formed. Each one was named by a different colour; this way, the blue, red, green and yellow team were created and their members took a seat around a separate round table (Figure 1). Each team was assigned to a member of the group of organizers (AUTh), who acted as the facilitator of the team. One of the four facilitators was acting also as the general moderator, i.e. the person responsible for the smooth realization of the whole event. An ice – breaker activity followed; participants were asked to introduce themselves to the rest of the team, by providing some basic information about themselves and also by sharing with the others the first word, feeling or experience that comes to their mind when they think about Public Transport in Thessaloniki. Following that, the "Appreciative Inquiry" method was used; the members of each team were asked by the moderator to imagine and then describe the ideal trip using Public Transport. Participants were encouraged to not limit their imagination and creativity but to express any idea they want, regardless for instance its potential feasibility (Figure 2).

Figure 1 The four round tables formed by the Workshop participants

Figure 2 Example of a conceptual map depicting the ideal trip

In cases when the problem solving approach is used, as it was done during the first co – creation workshop in Thessaloniki [13], participants are asked to focus on the problems they face and try to overcome them. Therefore, in this approach, stories and experiences of the past shape the present situation, while at the appreciative inquiry method used here, stories of the future shape the present situation. Each problem is an unfulfilled dream.

After having imagined and illustrated their ideal trip, during the next session, participants were asked to focus on the desired /ideal situation and try to come up with innovative ideas in order to improve the current situation towards this target. Four different issues were discussed, which corresponded to one or more of the most significant trends: (1) Public Transport services for people with disabilities, (2) Exploitation of innovative technologies on Public Transport systems, (3) Lifestyle and Public Transport systems and (4) Development of application-games for increasing the share of Public Transport systems (Gamification).

This session was realized using the “World Café”, the “Role playing”, and the “Conceptual mapping” methods. The World café was implemented in two rounds. During the first round, the participants discussed the topic which was assigned to their team, while at the second round they could change tables freely in order to enrich with their ideas the topics assigned to the other teams. The “voice” of each team (the participant who presented the idea) remained at the same table, as the host of the table, in order to help the “guests” get familiarized to the concepts in discuss. This way, all the participants were given the opportunity to move around and express their views and ideas concerning all the examined issues.

3. Results and Discussion

This section includes the main and more interesting results of the final phase of the co-creation workshop, as they emerged from each one of the four teams of participants.

The members of the green team examined ideas to improve Public Transport services for people with disabilities. Their suggestions were based on the analysis of the needs not only

of people with physical impairment, but also of people with mental impairment as well as the elderly. The objective of the red team was to investigate the potential to transfer innovative technologies from other business sectors to Public Transport or to identify new innovative technologies. The proposed ideas were clustered in four major thematic axes related to some of the most important users' needs, namely waiting and travel time perception, door to door travel time, comfort/convenience and information.

As for the yellow team, the aim of the discussion held among the participants, was to suggest innovative ideas towards potential changes in the lifestyle of citizens so as to enhance the use of Public Transport in cities. They designed their conceptual map, based on five main thematic axes: education, work, health, entertainment and shopping, stating novel ideas for each category. The last one, blue team, had as an objective to come up with innovative ideas towards the development of games/applications, in order to increase Public Transport patronage. In line with the previous activity during which they imagined their ideal future trip, this team chose to focus on developing concepts for bus users, and especially for the part of the trip that includes the time spent on the bus.

In total, 31 ideas/concepts emerged through vivid discussion among the members of all teams, and then they were presented to the other participants (plenary discussion session) and assessed by them using the "Dot voting" method. A few concepts were very similar to each other, therefore they were merged in order to avoid confusion. The results of the dot voting process (in descending order) regarding the 28 final concepts are presented in Table 1 [13].

As it is obvious from Table 1, the two most prominent concepts according to the evaluation of the Workshop's participants are: the "social - bus" and the "environmental trip".

More specifically, the "social – bus" would work as follows: At the moment a passenger gets on the bus, a notification would show up on his/her phone (free wifi network on the bus and activated GPS services are a prerequisite for the operation of this app) asking if they would like to participate to an online chat room to discuss with or/and follow the discussions held among the rest passengers of this specific bus. It would be mainly youth – oriented. At this chat – room, humorous/romantic messages would be welcome (e.g. "the girl on the red dress sitting by the window at the last row is very beautiful! If she interested in knowing who believes that, she should take the same bus number, same hour tomorrow and wait for me by the ticket vending machine at the middle of the bus", or "the smile of the tall mysterious guy wearing this cool pair of sunglasses made my day, thank you for that stranger!"). The "environmental trip" involves a similar rewarding system as the one currently offered by the airline companies; "the more you travel, the more you win", as a way to motivate people to leave their car behind and chose Public Transport instead. It could also count the CO_2 emissions, inform the users about their personal CO_2 footprint and encourage them to travel more by Public Transport [13].

Table 1 Innovative concepts that have emerged – dot voting

Number	Innovative Idea	Number of votes
1	**"social – bus"**	8
2	**"environmental trip"**	6
3	**"fitness – bus"**	4
4	**"party – bus"**	4
5	**"free WI-FI network on board"**	3
6	**"improvement of the artistic quality of vehicles and stops"**	3
7	**"special screens for informing and entertaining the passengers"**	3
8	**"music+"**	2
9	**"fast queueing"**	2
10	**"culture – bus"**	2
11	**"temporary storage area"**	2
12	**"accessible design both at stations and stops"**	2
13	**"high precision GPS device"**	2
14	**"on – board shopping"**	2
15	**"emergency-bus"**	2
16	**"history – bus"**	1
17	**"mental – bus"**	1
18	**"art – bus"**	1
19	**"corporate social responsibility"**	1
20	**"information from fellow passenger"**	1
21	**"last – mile service"**	1
22	**"compliance of the national legislation with the EU legislation"**	1
23	**"colour – challenge"**	1
24	**"artificial intelligence – Identification of passengers"**	1
25	**"emergency health button"**	1
26	**"small autonomous vehicles"**	1
27	**"drone stations"**	1
28	**"WC at each stop"**	1

4. Conclusions

The application of the whole process highlighted the strengths and the drawbacks of each one of the methods used, as well as the importance of the effective and discreet steering, facilitation and moderation of the discussion in each group. As a conclusion, the integration of co-creation (participatory planning) methods in the process of developing solutions, services, systems and strategic plans in the fields of public transport and sustainable mobility (e.g. SUMPs), through a methodologically structured way, could help the relevant stakeholders (authorities, providers, etc.), by supporting decision making and meeting the needs of travellers in a more effective way. An important lesson learnt from this workshop is that when

the appreciative inquiry method is used, more innovative and challenging solutions emerge, comparing to the problem solving method that was applied by the research team in another workshop [13]. At the end of the workshop, participants were asked to fill in an assessment questionnaire. Most of the participants expressed a positive view about the workshop as a whole as well as the specific topics of it. Furthermore, almost all of them made positive comments about the on-site organization and support. Last but not least, all participants considered the co – creation workshop as a process that truly supports creativity and they are willing to participate again in such events, as they appeared convinced about their usefulness and importance.

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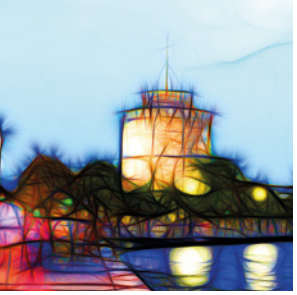

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METHODOLOGY FOR SELF-EVALUATION AND CAREER ORIENTATION

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This paper aims to present the initial analysis as a part of a methodology development in help for young people, students and graduates. The methodology aims to provide means for useful and critical self-evaluation, and based on it – to choose the most appropriate career path for them. The presented methodology emphasizes on the importance of self-awareness and understanding about oneself combining a variety of personal factors. Through theoretical analysis on existing evaluation tests and criteria in psychology, biology, social science, neuroscience, neuro-linguistic programming, business coaching, behavioural models and others, the right elements in the process of self-evaluation are identified. Further, the findings that this paper presents, allow for a more sophisticated and objective testing methodology, which consequently leads to better usability and application of the research.

Keywords
Career Orientation, Education and Career, Self-assessment, Self-evaluation,

1. Introduction

This paper aims to present the initial analysis which are part of a methodology development in help of young people, students and graduates to have a useful and critical self-evaluation, and based on it – to choose the most appropriate for them career path. It emphasizes on the importance of self-awareness and understanding about oneself combining a variety of personal factors.

2. Methods

The research is based on theoretical analysis on existing evaluation tests and criteria in psychology, biology, social science, neuroscience, Neuro-linguistic Programming, business coaching, behavioral models, and other.

3. Main Body

In a study conducted back in 1993 Hettema and Deary stressed that the explanation of behavior requires different levels of analysis. Such as genetics, physiology, learning and social factors. As stated before, this paper aims to present a variety of studies on personality traits grouped into three parts: biology-based, neuroscience, and behavioral models. The outcomes of this research should seek continuum into the further resolution of the key traits related to career orientation, and into the formation of a self-evaluation test, suitable for high-schoolers, university students and young corporates.

"The power to discover your voice lies in the potential that was bequeathed you at birth. Latent and undeveloped, the seeds of greatness were planted. You were given magnificent “birth-gifts”-talents, capacities, privileges, intelligences, opportunities-that would remain largely unopened except through your own decision and effort. Open these gifts. Learn what taps your talents and fuels your passion-that rises out of a great need in the world that you feel drawn by conscience to meet-therein lies your voice, your calling, your soul’s code." (Covey, 2004).

Stephen Covey provides a good framework for this research which intends to result in a helpful tool for self-evaluation and career orientation.

3.1. Personality Traits According to Biology

Modern personality theories differ in their assumptions about the structure and etiology of the interplay between personality traits and motivational constructs. The study named “Nature and Nurture of the Interplay Between Personality Traits and Major Life Goals” examined the genetic and environmental sources of the interplay between the Big Five personality traits and major life goals concurrently and across time to provide a more decisive evaluation of the conflicting assumptions stated in the five-factor theory as opposed to socioanalytic conceptions. Traits and goals were assessed twice across a 5-year period in a sample of 217 identical and 112 fraternal twin pairs from the Bielefeld Longitudinal Study of Adult Twins. (Bleidorn et al, 2010)

The study concluded that about 30% of the variance in agency and communion life goals was genetic; the remaining variance was due to nonshared environmental effects, whereas shared environmental effects were negligible. Both heritable and environmental variance in goals could partly be accounted for by genetic and nonshared environmental effects on personality traits. Across time, the researchers revealed reciprocal genetic and environmental effects between traits and life goals. In sum, their findings yield partial support for the 2 competing personality theories, suggesting a readjusted picture of the interplay between traits and goals. (Bleidorn et al, 2010)

Consideration of cultural influences on personality is important because Western ideas and theories are not necessarily applicable to other cultures (Benet-Martinez & Oishi, 2008). There is a great deal of evidence that the strength of personality traits varies across cultures, and this is especially true when comparing individualist cultures (such as European, North American, and Australian cultures) and collectivist cultures (such as Asian, African, and

South American cultures). People who live in individualist cultures tend to believe that independence, competition, and personal achievement are important. In contrast, people who live in *collectivist cultures* tend to value social harmony, respectfulness, and group needs over individual needs. These values influence personality in different but substantial ways; for example, Yang (2006) found that people in individualist cultures displayed more personally-oriented personality traits, whereas people in collectivist cultures displayed more socially-oriented personality traits.

Ideas of appropriate behavior for each gender (masculine and feminine) vary among cultures and tend to change over time. For example, aggression and assertiveness have historically been emphasized as positive masculine personality traits in the United States. Meanwhile, submissiveness and caretaking have historically been held as ideal feminine traits. While many gender role remain the same, others change over time. In 1938, for example, only 1 out of 5 Americans agreed that a married woman should earn money in industry and business. By 1996, however, 4 out of 5 Americans approved of women working in these fields. This type of attitude change has been accompanied by behavioral shifts that coincide with changes in trait expectations and shifts in personal identity for men and women.

Maccoby and Jacklin (1974) conducted the first major review of research on sex-related differences in cognition, temperament, and social behavior in children and adults. They concluded that men are more assertive and less anxious than women. However, in this study, no differences were found for two other traits analyzed, locus of control and self-esteem.

Feingold (1994) used meta-analysis to confirm the gender differences in adult personality traits reported by Maccoby and Jacklin (1974) and explored other gender differences in normative data from the most widely used personality inventories. He concluded that women scored lower than men on assertiveness and higher on extraversion, anxiety, trust, and tender-mindedness (nurturance). He organized his review in terms of the five broad factors and 30 specific facets of the Revised NEO Personality Inventory (NEO-PI-R; Costa & McCrae, 1992). As a comprehensive guide to personality traits, that model can provide the basis for a systematic examination of gender differences in personality.

The biological theories consider “sex-related differences as arising from innate temperamental differences between the sexes, evolved by natural selection. Evolutionary psychology (Buss, 1995) predicts that the sexes will differ in domains in which they have faced different adaptive problems throughout evolutionary history. For example, for biological reasons, including pregnancy, childbirth, and lactation, women have more invested than men do in relations with children. Women who were more agreeable and nurturing may have promoted the survival of their children and gained evolutionary advantage” (Costa, Terracciano and McCrae, 2001).

In 1936 Gordon Allport categorized the traits (Gordon Allport’s Trait Theory) which he found into three levels: 1) Cardinal Traits – traits that dominate an individual’s whole life, often to the point that the person becomes known specifically for these traits. People with such personalities often become so known for these traits that their names are often synonymous with these qualities. 2) Central Traits – the general characteristics that form the basic foundations of personality. These central traits, while not as dominating as cardinal traits, are the major characteristics that might be used to describe another person. Terms such as intelligent, honest, shy and anxious are considered central traits. 3) These are the traits that are sometimes related to attitudes or preferences and often appear only in certain situations

or under specific circumstances. Some examples would be getting anxious when speaking to a group or impatient while waiting in line.
The trait theorist Raymond Cattell reduced the number of main personality traits from Allport's initial list of over 4,000 down to 171, mostly by eliminating uncommon traits and combining common characteristics. Next, Cattell rated a large sample of individuals for these 171 different traits. Then, using a statistical technique known as factor analysis, he identified closely related terms and eventually reduced his list to just 16 key personality traits.
According to Cattell, these 16 traits are the source of all human personality. He also developed one of the most widely used personality assessments known as the Sixteen Personality Factor Questionnaire (16PF)".

3.2. Personality Traits According to Neuro-science

In an Article Colin G. DeYoung states that "The mission of personality psychology is ''to provide an integrative framework for understanding the whole person'' (McAdams & Pals, 2006), and many different methods must be brought to bear to accomplish such an ambitious goal. Personality neuroscience has focused primarily on traits, which are relatively stable patterns of behavior, motivation, emotion, and cognition (Pytlik Zillig, Hemenover, & Dienstbier, 2002; Wilt & Revelle, 2009).
The aim of personality neuroscience is to understand both the biological systems that are responsible for the states associated with traits and the parameters of those systems that cause them to function differently in different individuals.
According to Bouchard & McGue, 2003; Riemann, Angleitner, & Strelau, 1997, "when considering the biological sources of personality, one must distinguish between proximal and distal sources. The biological and anatomical sources, described in the previous sections, consist of stable differences in the functioning of the neural systems that produce the states associated with traits.
Personality neuroscience can usefully be guided by existing knowledge about the structure of personality – that is, knowledge about how various traits relate to one another and to the major dimensions of personality. The Big Five model is the result of decades of work using factor analysis to map the patterns of covariation among traits. Lexical and questionnaire research have both provided evidence for the Big Five (Digman, 1990; John et al., 2008; Markon, Krueger, & Watson, 2005). Traits can be arranged hierarchically, with correlated groups of more specific traits categorized together in broader traits (Markon, 2009). At least one level of structure exists above the Big Five. Although the Big Five were originally conceived as independent traits and the most general level of personality description, research has shown that they are regularly intercorrelated and possess a higher-order factor structure (DeYoung, 2006; Digman, 1997; McCrae et al., 2008).
Furthermore, many researchers have discovered a relationship between sleep and personality traits. In a "Study of Patterns and Subjective Quality of Sleep and Their Correlation with Personality Traits among Medical Students of Hamadan University of Medical Sciences" Nasab and Azimi (2008) present a study which was conducted due to the fact that less considerations have been devoted to correlation between sleep disturbances and personality traits. The purpose of their research was to determine personality traits and

sleep patterns among medical students in Hamadan Medical University. (Nasab and Azimi 2008)

The findings of this study showed that 48 percent of the cases (in total 150 randomly selected medical students) have suffered from sleep disturbances. The number of personality traits such as narcissistic, histrionic and borderline (cluster B) observed among students had greater frequencies than other traits. The average of night and day sleep time was 8.95±2.01. However, the study did not find a meaningful correlation between sleep disturbances and personality traits in the cases" (Nasab and Azimi 2008).

An actigraphy study by Yaugher and Alexander (2015), states that Internalizing and externalizing traits predict changes in sleep efficiency in emerging adulthood. The objective of the study was to present an extended research by examining sleep, impulsivity, antisocial personality traits, and internalizing traits in a university sample. Three hundred and eighty six (386) individuals (161 males) between the ages of 18 and 27 years wore actigraphs for 7 days and completed established measures of disorder-linked personality traits and sleep quality (i.e., Personality Assessment Inventory, Triarchic Psychopathy Measure, Barratt Impulsiveness Scale-11, and the Pittsburgh Sleep Quality Index)" (Yaugher and Alexander, 2015).

Higher levels of impulsivity predicted poorer subjective sleep quality in both women and men. Consistent with well-established associations between depression and sleep, higher levels of depression in both sexes predicted poorer subjective sleep quality. Bidirectional analyses showed that better sleep efficiency decreases depression. Finally, moderation analyses showed that gender does have a primary role in sleep efficiency and marginal effects were found. The observed relations between sleep and personality traits in a typical university sample add to converging evidence of the relationship between sleep and psychopathology" (Yaugher and Alexander, 2015).

In the paper "General and Specific Traits of Personality and Their Relation to Sleep and Academic Performance" paper, Gray and Watson (2002) conduct a study where the participants completed numerous personality, sleep, and performance measures. The researchers examined the associations among these measures and personality was assessed using the Five-Factor Model" (Gray and Watson, 2002).

The findings of their research states that personality trait of Conscientiousness (especially its facet of Achievement Striving) was a substantial predictor of academic performance. Analyses of the sleep variables revealed three distinct constructs: quantity, quality, and schedule. Sleep quantity showed few interesting correlates. In contrast, sleep quality was associated with greater well-being and improved psychological functioning, whereas sleep schedule (i.e., average rising and retiring times) was significantly related to Conscientiousness, such that conscientious individuals maintain earlier schedules" (Gray and Watson, 2002).

Another study – "Effects of Sleep Deprivation and Morningness-Eveningness Traits on Risk-Taking" conducted by Killgore (2007) reaches to the conclusion that individuals differ along a continuum of preference for diurnal activity level, known as Morningness-Eveningness. The study examined (1) whether Morningness was correlated with self-reported and behavioral measures of risk-taking, and (2) whether one night of sleep deprivation would produce changes in risk-taking and sensation-seeking. The general conclusion was that individuals

low in Morningness traits, i.e., preferring later awakening and bed times, have been shown to score higher on personality traits of impulsiveness and novelty-seeking.
In a study Giese and Sojka (2001) investigate individuals' preferences for visual as opposed to verbal information and explore how those preferences relate to processing style personality traits. Their research, “The Influence of Personality Traits on the Processing of Visual and Verbal Information”, discovers that in comparison to individuals with other processing style personality traits, individuals with a high need for cognition prefer to process verbal information while individuals with a high need for affect prefer to process visual information. Linking processing style personality traits with preferences for visual/verbal information increases our theoretical understanding and practical applicability of personality traits.” (Giese and Sojka, 2001)
Katherine Benziger's model on personality and brain-type theory is relatively recent compared to the Four Temperaments, Jung, Eysenck, etc. Benziger's key book, The Art of Using Your Whole Brain, was first published in 1989, revised as 'Thriving in Mind' in 2000. Benziger's main psychometrics instrument is the BTSA (Benziger Thinking Styles Assessment). Katherine Benziger provides an unusual approach compared to many other personality thinkers because she places greatest emphasis on 'wellness' and the need to help people avoid 'falsifying' their true type. Benziger declares that very many people 'falsify type', so as to fit into a role or career path that might not be right for them, which has a negative impact on health, happiness and personal effectiveness.
Benziger's theory expresses personality in terms of four quadrants of the brain (basal means rear or back):

- Basal Left - process and routine
- Basal Right - intuition and empathy
- Front Left - logic and results
- Front Right - vision and creativity

Cloninger’s (1987) personality model postulates a functional association between basic dimensions of NS (Novelty Seeking), Rd (Reward Dependence), and HA (Harm Avoidance), and three major brain systems for the activation, maintenance, and inhibition of behaviors. Neuroanatomical and biochemical networks underlying personality dimensions of HA (Harm Avoidance), NS (Novelty Seeking), and RD (Reward Dependence), and regulating emotional and learning processes are discussed in the research.
Another study from 1990s resulted in the PRISM Brain Mapping Methodology where the mapping identifies people's behaviour preferences based on brain activity. Unlike traditional psychometric instruments, PRISM approaches human behaviour from the perspective of neuroscience, rather than psychological theory.
PRISM's methodology indicates an individual's natural/ instinctive behaviour preferences, and how preferences are modified and adapted when responding to perceived demands of specific situations, notably for example, in the job role.
The PRISM system does not claim to categorize people or 'score' answers in the way that many psychometric instruments tend to. Instead PRISM provides users with detailed explanation as to why they approach situations and individuals in different ways. PRISM provides three distinct profiles, or 'maps', of a person's behaviour:

- how the individual naturally prefers to behave

- the extent to which he or she feels it necessary to modify that behaviour on occasions to achieve key objectives, and
- the overall pattern of behaviour that he or she tends to use for most of the time.

In the context to neuroscience, the different learning styles of the individual must be taken into consideration as well. The VAK (visual, auditory, kinesthetic) learning styles model provides a very easy and quick reference inventory by which to assess people's preferred learning styles, and then most importantly, to design learning methods and experiences that match people's preferences. Visual learning style involves the use of seen or observed things, including pictures, diagrams, demonstrations, displays, handouts, films, flip-chart, etc.
Auditory learning style involves the transfer of information through listening: to the spoken word, of self or others, of sounds and noises. Kinesthetic learning involves physical experience - touching, feeling, holding, doing, practical hands-on experiences. Neuro-linguistic programming techniques are very much based onto the consideration of the different learning styles.
Another influential type of learning styles theory was developed by David Kolb in the early 1970s. His theory of experiential learning and the instrument which he devised to test the theory – the Learning Style Inventory (LSI) – have caused a lot of analysis. (Kolb 1999).
Kolb's definition of learning styles (1981, 290) states that 'Learning styles represent preferences for one mode of adaptation over the others; but these preferences do not operate to the exclusion of other adaptive modes and will vary from time to time and situation to situation'.

3.3. Personality Traits According to Behavioural Models

In addition to the above discussed biological and neuroscience traits models, this research claimed to focus also on personality traits as per the behavioural models.
The study of Eysenck (1967) sees personality as organized along three primary dimensions: extraversion versus introversion, neuroticism versus emotional stability, and degree of psychoticism (tough-minded aggressiveness). He regards narrow traits such as impulsivity and sociability as components of the higher order traits, such as extraversion.
In a study of Walumbwa; Schaubroeck (2010), the authors looked at the effect of authentic leadership behavior on the organizational citizenship behavior and work engagement of followers, both direct and indirect. The subjects were 387 employees and their 129 immediate supervisors. The results indicated that authentic leadership behavior was "positively related to supervisor-rated organizational citizenship behavior and work engagement, controlling for ideal power distance, company type, and followers' demographics such as age and sex. These relationships were mediated by the followers' level of identification with the supervisor and their feelings of empowerment.
Derived from two theoretical concepts - situation strength and trait activation - Judge and Zapata, develop and test an interactionist model governing the degree to which five-factor model personality traits are related to job performance. One concept - situation strength - was hypothesized to predict the validities of all of the "Big Five" traits, while the effects of the other - trait activation - were hypothesized to be specific to each trait." (Judge and Zapata, 2015)

The results of the study revealed that all five traits were more predictive of performance for jobs in which the process by which the work was done represented weak situations (e.g., work was unstructured, employee had discretion to make decisions). Overall, the study's findings supported the author's interactionist model in which the situation exerts both general and specific effects on the degree to which personality predicts job performance." (Judge and Zapata, 2015)

However, other researchers suggest that the degree to which personality predicts job performance depends on contextual variables (e.g.,Barrick & Mount, 1993)

In addition, there are the social cognitive theories which emphasize the active, conscious aspects of personality and suggest that individuals interpret events differently due to their memories, beliefs, and expectations. (Psychology, 5/e Wortman, Loftus & Weaver)

One form of social cognitive theory stresses observational learning, or learning by watching others (partially relating to the learning styles discussed previously). Social cognitive theories also stress that human behavior is shaped by expectations, which are continually revised through observational learning. Albert Bandura believes that when people believe they can deal effectively with their situations, a characteristic he calls self-efficacy, they are more likely to try new tasks.

Offering a social cognitive theory to account for how personality styles or expectations are maintained over time, Nancy Cantor has identified three basic elements of personality functioning that distinguish individuals from one another: schemas (organized sets of knowledge), tasks (the goals we set for ourselves), and strategies (the techniques and procedures we use to work on our life tasks).

Other social cognitive theorists emphasize self-schemas, the set of knowledge about the self that guides perception and interpretation of information in a social setting.

Although the social cognitive learning approach has become more popular and influential, they do not explain why people tend to show consistent behavior in widely varying situations. Furthermore, they do not prove that the way people think about themselves determines their behavior; perhaps behavior determines the way people think about themselves. Finally, social cognitive theories tend to neglect emotions.

The five-factor model (FFM) of personality, which is made up of the dimensions of Agreeableness (reflecting likability and friendliness), Conscientiousness (dependability and will to achieve), Emotional Stability (adjustment vs. anxiety), Extraversion (activity and sociability), and Openness (imaginativeness, broad-mindedness, and artistic sensibility), has been important in the field of study. The value of the FFM is that "it encompasses most of the variance in personality description in a simple set of dimensions and thus brings order to the previous "chaotic plethora" of personality measures (Funder, 2001, p. 200)."(Poropat, 2016). Moreover, "Barrick and Mount (1991) used the FFM to organize their meta-analysis and thus provided one of the first broad-ranging estimates of the relationship between personality and work performance. Since then, a series of meta-analyses, culminating in Barrick, Mount, and Judge's (2001) second-order meta-analysis, have provided a largely consistent picture: Personality measures, especially Conscientiousness, are associated with a range of workplace performance criteria" (Poropat, 2016).

4. Conclusions

The above analysis tries to identify the right elements in the process of traits evaluation, allowing for a more precise choice when the appropriate traits should be selected as part of the future self-evaluation test to be developed as a result of this study. The end goal of this research will be a sophisticated and objective testing methodology which consequently leads to better usability and application of the research.

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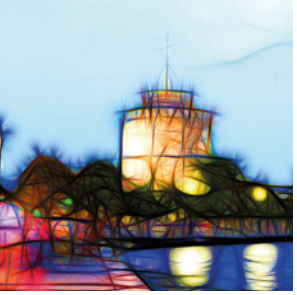

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NEW CHALLENGES FOR INNOVATION MANAGEMENT

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1. Introduction

There is a rich literature on the management of innovation processes, which documents innovation dynamics in the 20th century. In the traditional understanding of technological innovation - as it was shaped by the views of numerous scholars and practitioners over the past decades - the innovation process consists of several phases and/or components and relations between them; it has a number of characteristic features (interactivity, complexity, etc.) and is driven by internal mechanisms; it usually receives an organizational form of innovation project. However, in the context of multiple drivers that change our world at an unprecedented pace - including the advanced globalization of markets, capitals and technologies, the increasing international mobility of human capital and the changing nature of social and organizational relationships under the influence of new technologies - is this traditional meaning of the innovation process still valid? In other words, can we still envision the innovation process in the 21stcentury along the lines defined in mid-20thcentury? The inspiration to formulate such questions has been [10] book on *Open innovation.*

Open innovation causes that a contemporary innovation process does not constitute a pithy whole any more. Enterprises apply various methods or forms of their participation in the open inbound-innovation mechanisms. Firms incorporate the obtained knowledge into their innovation processes/projects 'at home'. This means that the transfer of scientific and technological knowledge has taken place, sometimes through the purchase of another enterprise.

Observations of the present economic reality seem to prove that, nowadays, the innovation process *de facto* is *a combination of dispersed processes,* partly independent, very diverse and complicated. This undoubtedly is a new organizational field being a result of reconfiguration of the innovation process [29]. According to [8], the process of innovation now is a set of different, parallel, competitive and contradictory processes often taking place at the same time, which creates a bit chaotic composition. In our view, the concept of distributed innovation [74] refers to dispersed processes.

So, a contemporary technological innovation is the result not of one but of several processes. However, here we don't mean the depiction, which assumes that innovation is the result of a complex set of processes inside the organization [18], [28], [76]. Innovative processes today go far beyond enterprises.

As described in the previous studies [47], we are witnessing the strengthening of the following features of contemporary innovation activities: (1) *a bigger openness of innovation,* the basis of which is (2) *creation and flows of knowledge* which are not possible without (3) *a broad, varied cooperation*, sometimes loose or informal, which may turn into (4) *creative partnership*,

more and more often strategic, which takes place (5) *in the context of ecosystem* that is very dynamic.
The main aim of this paper is to identify new challenges faced by innovation managers that result from the fact that a contemporary technological innovation more and more often comes as a result of a quite loose set of dispersed, partial processes and not of a put-in-order, several-phase innovation process although non-linear.

2. The multi-process model of innovation

On the basis of the observation that a contemporary innovation is – more and more often – a combination of processes (not phases), *the multi-process model of innovation* has been elaborated [46]. Its assumptions are as follows:

1. Innovation 'stands on two pillars': while one pillar still lies in the R&D sphere, another one already lies in the production sphere, and between the two there is a transfer or flow of scientific and technological knowledge [44].
2. Sometimes there is no continuity from R&D to production implementation, for example, when the results of a research project – undertaken by a research organization on its own initiative – go 'on the shelf' after being finished. Moreover, not only new (the newest) knowledge being used in innovation activities but accumulated knowledge is often used, as in the chain-linked model [53].
3. Particular, partial processes can be and are held at different times and at various places of a national or even of the world economy as a result of the distributed nature of knowledge production [74] or of the dispersed process of knowledge production [89].
4. We witness the internationalization or rather globalization of innovation processes (by some people called techno-globalism[1]), which causes breaks in the chain of existing relations among partial processes.
5. The entities participating in innovation activities are much diversified. These are production firms, other firms, scientific organizations, various institutions and also house-holds – the latter as in the model of user-driven innovation [66].
6. Many production enterprises now are parts of more or less formalized networks. A networked character of firms and institutions, and of the cooperation among them, is favourable to atomization of the innovation process. This is consistent with a general observation that today, business is more and more vulnerable to decomposition into independent modules or components that are able to merge in various configurations [87].
7. The innovation process no longer is a continuous, closed and coherent process with an easy-to-identify beginning and end. For example, in the case of open innovation it is hard to determine where and when this process has started. Sometimes it may not finish with commercialization.

[1] See, eg, Edgerton (2007), Montresor (2001), Weresa (2012). However, a globalization of innovation is a broader notion.

In our multi-process model, each body participating in a given process may be treated as an internal client. This can be, e.g., a research organization, an industrial enterprise implementing a new solution and a firm launching a new product into the marketplace. In turn, a final client here will be a consumer or another customer (enterprise, institution or another organization).
The multi-process model of innovation, embracing *a set of processes* where the following conventionally named processes can be included, looks as below [46]:

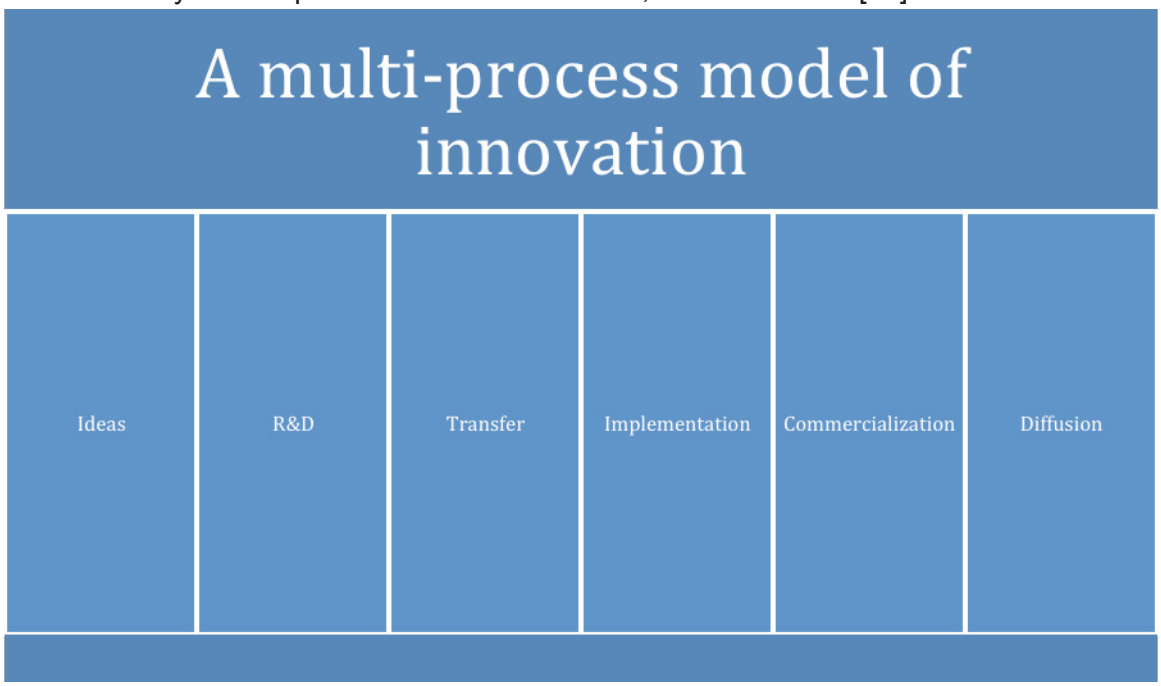

Figure 1 Multi-Process Model of Innovation

Each part of the model creates a new knowledge that has a certain (partial) value. In this way, an innovation value chain arises. We must explain here that:

- These are not phases of the innovation process, but rather processes creating a contemporary innovation activity.
- This is a non-linear mechanism: sometimes another sequence of processes may happen. For instance, during research - by coincidence - an idea can appear for the new product earlier not taken into account.
- Certain processes, e.g., 'Ideas' and 'R&D' can occur in parallel.
- The actions making up knowledge transfer and innovation diffusion are not typical, indigenous workings being parts of the innovation process and accompanying it.
- In the case of a concrete innovation, not all phases must take place; some of them may not exist. For example:
  1) if a new scientific and technological solution is the result of the R&D work conducted inside the firm, a knowledge transfer will not take place,

2) if the firm has bought a technological license, which is a mark of transfer, then idea generation and scientific research are not needed. Perhaps some post-license work will be necessary,
3) as far as process innovation is concerned, its commercialization will not happen when a new manufacturing technology stays in the enterprise,
4) innovation diffusion, here understood as a spreading of a given innovation among other producers-followers, does not have to occur and sometimes it doesn't occur.

- Finally, the only process that must take place is a production implementation because it determines whether technological innovation will appear or not.

To summarize, this is a simplistic outline of the multi-process model of innovation. It needs to be polished up and developed. Especially, inter-relations between particular processes creating the value require further research. Nevertheless, the presented model may be useful in improving the management of contemporary innovation processes.

3. Challenges to be faced by managers

The mentioned reconfiguration of innovation processes entails certain implications for practice, especially new challenges to be faced by the managers of innovative activities in their enterprises. Below we only focus on some of the challenges in the context of the multi-process model.

There are at least two major dimensions/perspectives that can be taken into account here: (1) the firm size: small & medium-sized enterprises (SMEs) or big & giant enterprises (BGEs), and (2) an innovation type from the point of view of its novelty level: radical or incremental. The main difference between the two types of firms is that SMEs usually do not possess in-house R&D competences or infrastructure, while the main difference between the two types of the change is that a radical/breakthrough or niche-innovation, as [29] would say, requires a new business model ([13], [35], [77], [85]. This section of the paper is mainly devoted to BGEs.

A starting point of all decisions and actions in innovation management should be a permanent, attentive observation of what happens in a given field (market, sector) in the world and in forecasting of what may happen in the future. The issue of choice in the field of innovation appears when a firm is starting to look for appropriate external knowledge. This is a very responsible task because, according to [81], the chosen pathways can quickly become effectively irreversible.

First of all, a decentralization of the innovation management is needed [74]. Here we mean a delegation of duties and entitlements to the subjects/entities running particular activities, together with a relevant allocation of resources among various processes. Let's notice that for [13], the allocation of resources and the management of innovation are both sides of the same coin.

The range of those subjects' independence in this area should be relatively broad because their responsibility is relatively big. For example, it may sometimes happen that someone else will be responsible for gathering and consulting ideas from the Internet; someone else – for the R&D work conducting, e.g., abroad; someone else – for production implementation of a

new product at the place of the firm's residence; and someone else – for the product launching into the marketplace. In connection with this, the highest rank should receive the supervision over those persons or activities, which is impossible without an effective, many-sided communication among them.

Network relations make the coordination of innovative activities easier. According to [7], the main coordinator or integrator of 'the innovation network' should be an innovating firm. For instance, a cluster of enterprises may create such network with one of them being the integrator. The concept of creative factory by [28] may be helpful here.

Innovation is by nature a risky activity. Therefore, [76] find that innovation management is closely linked to uncertainty management. Due to the fact that additional uncertainty arises as a result of a dispersion of this activity[2], an ability to undertake and manage a risk becomes necessary. Contemporary innovation needs brave leaders.

According to [16], innovation requires a special type of leadership. Not all leaders are fit to be innovation leaders. There exists no single pattern of leadership in innovation. The author divides the innovation process into two big conventional stages. The chairmanship in the first phase – from idea to conception, where creativity and the ability to take risks count – demands fundamentally different personality predispositions and another style of leadership than carrying out such functions in the second phase – from conception to product launching into the marketplace, where discipline and acting speed count (*ibidem*, p. 9). Finally, he concludes that various innovation strategies require different types and styles of leadership.

Due to the mentioned atomization of innovative activities, nowadays, innovation can't emerge without a skillful, many-sided science-technological cooperation among various entities. Trust in partners is the basis of this collaboration. For instance, trust is needed because there appears the issue of 'collective property rights' [74] as a key challenge for managers. According to [30], trust increases through experience with interactions among firms and other actors. Therefore, an effective management of this cooperation is so important. Here the managers can make use of achievements in the theory of management of inter-organizational relations (see, e.g., [1], [39], [56]).

One of characteristic features of innovation activities is the fact that research project management contains a set of actions which – according to [51] – are not fully defined and sometimes only sketched out. Consequently, such methods as the management of competences, talents and knowledge come to the fore in the coordination of research projects. If needed, there is a rich world's literature on project management to be used here.

The open innovation model is based on knowledge flows between the firm and other actors on the innovation scene.[3] A modern innovating enterprise should make use of so-called network reserves or network capital [31], [36]. These resources can be defined as interactions and relations – being used by organizations to obtain knowledge – that can exist in formal or informal knowledge alliances favourable to innovation [54]. These alliances are one of many forms of scientific-technological cooperation, and the knowledge emerges in the course of various processes creating the innovating activity. On the basis of empirical research among 83 British firms, [36] showed that access to network reserves in the form of knowledge alliances is positively correlated with their innovation performance.

[2] As remember, Rip *et al* (2010) warn that distributed innovation means some loss of control for central actors.
[3] The concept of the innovation scene, based on the Triple Helix model by Etzkowitz and Leydesdorff (1995), was presented in Jasinski (2003).

Network creates a kind of innovative environment containing certain knowledge resources that arise during partial innovation processes. Afterwards, this knowledge is 'thrown' into the network. Such behaviour is favourable to the innovation openness but, at the same time, it causes the mentioned atomization of the innovative activity into partial processes. Open innovation, in turn, is accompanied by such modern ways of supporting action as outsourcing, open source, crowdsourcing and crowdfunding (Table 1). They may be used by managers to support relevant innovative activities both in BGEs and SMEs.

Table 1. Modern ways of supporting action and partial innovation processes.

Processes	Outsourcing	Open Source	Crowdsourcing	Crowdfunding
Ideas			X	
R&D	X	X		X
Transfer	X			
Implementation				X
Commercialization	x			
Diffusion		X		

Source: the author

As seen, the biggest possibilities to use these ways of action/support refer to R&D. Thanks to them, an innovating firm is able not only to derive practically free of charge the necessary knowledge (ideas, conceptions, opinions on suggested solutions, etc.) from the environment via *crowdsourcing*[4], but the firm may limit its own budget devoted to R&D and other activities, too. It is worth to notice that Procter& Gamble, mentioned here in section 3, was among the top three crowdsourcing users in 2014 (https://en.eyeka.com). Also, external resources can sometimes be obtained for production implementation – not only from a bank or a grant but through *crowdfunding* or within a strategic partnership. In turn, commercialization costs (and risk) can be divided between 'us' and another partner who introduces a new product into the marketplace. All this proves a huge significance of cooperation agreements, especially in a form of *outsourcing*. Finally, *open source* enables the enterprise to access the results of external R&D and is favourable to innovation diffusion.

As far as crowdfunding is concerned, the best known Internet portal used by internauts to finance their business ideas is the American portal Kickstarter. For instance, a small Polish entrepreneur, Mr B. Matusiak, has collected USD 150,000 via Kickstarter to build a device called Sherlybox – a private 'cloud' for data storing [82]. However, the portal gives only 30 days for money collecting, therefore, one must invest in a promotion of his/her own idea first.[5]

[4] Moffitt (2016) treats open innovation as one of 14 types of crowdsourcing (www.seanmoffitt.com)
[5] Legal aspects of crowdfunding are described in ECN (2013).

The above ways of supporting action help omit various troubles and obstacles during the innovation processes, however, effective innovation leaders are needed to manage these actions skillfully.

4. The model of Partnership for Innovation

As known, small and medium-sized enterprises who want to be innovative, suffer from a lack of cooperation with other entities (see, e.g. [22], [47], [48], [59], [80], [85]. Such firms need to forge good partnerships to innovate. So, a *Partnership for Innovation,* where various partners/stakeholders may participate, seem to be a proper way to achieve this objective. A Partnership for Innovation can include six partners [47].

- *An innovation user*, especially consumer. In the world of innovation and value creation, this should be the most important participant in such partnership. For example, [73] focus on the central position of an individual consumer, for whom a kind of innovation loop usually begins and finishes. User satisfaction, not of a present user, but of a future one, ought to be the main imperative in all innovation activities, although sometimes a new consumer needs to be created for a new product or process. So, the concept of user-driven innovation [66] is very useful here.
- *A research entity* conducting R&D work that leads to new scientific and technological (S&T) solutions. This may be a unit, which is either a part of a given enterprise, holding, trans-national corporation, etc., or an independent institution that may run research and development on its own initiative or on an order of various public and private organizations. Special attention should be paid to this type of a participant in innovation, as SMEs often complain about cooperation with R&D institutions.
- *An entrepreneur* (small or medium-sized) who undertakes the implementation and commercialization of a new S&T solution. This may be a producer of commodities or services. No innovation will appear without him/her.[6] In our case, the entrepreneur is a smaller firm which very often does not possess its own research laboratory.
- *A professional agent* who plays the role of an innovation/technology broker can be a highly useful partner. This may be an individual person, an economic entity or a non-governmental organization (NGO). In literature, such intermediary agents are called 'bridging institutions' because they create a kind of bridge between an R&D organization and an entrepreneur. Their main activity domain is technology transfer servicing, both vertically and horizontally. The agent may even become an organizer/leader of the whole partnership.
- *A financial investor* can't be absent here. Nowadays, this is an extremely important partner in innovation activities that is useful especially for SMEs because they always suffer from a lack of sufficient financial resources to innovate. Such investor can be, e.g., a bank, a venture-capital fund, a business angel, etc.
- Finally, *a local government* may be an essential partner in these activities. Actually, innovation often has, at least at the beginning, a local dimension. Local government authorities can play here a double role: a direct one, e.g., via public procurement, and/or an indirect one, in the form of actions facilitating innovation processes. As far as the latter is

[6] It happens, but very seldom, that a research institution implements the S&T solution invented there.

concerned, the example may be a town mayor's decision to lease free of charge a municipal land or real estate to host a science park, an innovation incubator, a technology transfer center or another bridging institution. There is a room here for a public-private partnership (PPP). This last partner requires a special attention because of two major reasons: first, such partnerships are strongly encouraged by the European Commission's recommendations [19], and secondly, SMEs too seldom cooperate with local governments in the area of innovation [46].

The Partnership for Innovation model presented above is different from European Innovation Partnerships (EIPs), which are aimed to act as a framework bridging together major EU activities and policies and covering the whole spectrum from research to market [19]. However, the general idea is similar. The partnership for innovation, as a type of collaboration, may be more or less formalized, e.g., in the form of a consortium or a strategic alliance, or just a network. Such partnership can be a kind of remedy for dispersed, partly autonomic, de-integrated innovation processes.

5. Conclusions

Traditionally, innovation is usually seen as a process consisting of several phases/stages from the view-point of the firm. However, there exist substantial differences between the phases, various process configurations, various types of the innovation process and various innovation pathways. Moreover, innovation nowadays becomes open, distributed and more diverse.

As we tried to prove in this paper, a contemporary innovation more and more often comes as a result of a quite loose set of dispersed processes and not of a put-in-order, several-phase innovation process although non-linear. So, the question - *Does the innovation process per se still exist?*- seems justified. In this situation, a new conceptualization of this process is needed.

The innovation process *de facto* is a combination of dispersed processes, partly independent, very diverse and complicated. In our view, the concept of distributed innovation refers to the notion of the dispersed set of processes. However, we don't mean that innovation is the result of a complex set of processes inside the organization because innovative processes today go far beyond the firm.

Innovation, as a fragmented and dispersed combination of processes, brings many troubles for managers. The concept of the multi-process model of innovation may be helpful for them to face new challenges caused by those troubles. This is a school of thought that should, as soon as possible, dominate over the actions being undertaken by the managers engaged in the innovative activity. Therefore, the multi-process model presented in this article needs to be further polished up and developed. Especially, inter-relations between particular processes creating the value require further research.

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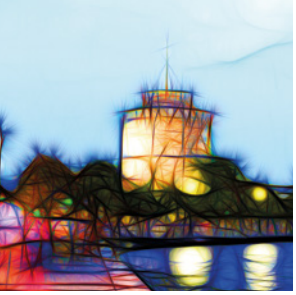

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AN OVERVIEW TO INNOVATION CAPABILITY OF THE GREEK AGRI-FOOD SECTOR

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In the present environment, innovation capability is playing a crucial role in agri-food companies' survival and it has been regarded as one of the most important factors in seizing new opportunities and enhancing competitiveness and entrepreneurship. Innovation itself as a concept is multi-dimensional comprising various types. It refers to all scientific, technological, organizational, financial and commercial activities which lead to the implementation of technologically new or improved products or services. The purpose of this study is, (a) to determine the innovation capability dimensions and (b) evaluate their implementation level in the agri-food companies operating in Greece under circumstances of financial crisis. Exploratory and Confirmatory Factor Analysis (EFA and CFA) as well as descriptive statistics are applied for this purpose. The analysis of the empirical data, confirms the conceptual structure of company innovation identified in the literature, which consists of four dimensions, namely product, process, marketing and organizational innovation. The innovation dimensions revealed, do not approach the excellent level, which means that the sample companies are not, in practice, totally oriented towards innovation. So, there is still room for a further increase in the degree to which the innovation practices are implemented.

Keywords
Agri-food Sector, Entrepreneurship, Innovation, Regional Development

1. Introduction

The agri-food sector is one of the largest processing sector within the EU and one of the main drivers of the EU economy in terms of a high economic output, playing a major role in employment [1,2]. In Greece, the agri-food processing industry contributes 25% of the Greek Gross Domestic Product (GDP) and employs 36% of national labor in 2015, making a disproportionately high contribution to the Greek economy [3] and regional development. The international situation was extremely positive for the agri-food sector the past 25 years; however, the lack of a coherent strategy prevented the sector to realize its objective comparative advantage [4]. According to [5], the agri-food processing industry is characterized by a high number of small units 90 per cent of which have less than 10 employees [6]. Many small agri-food firms operate in a business environment of increasing competition because of greater globalization, the reduction of trade barriers, and the consolidation of food retailers [7].

This combination of factors has increased the pressure on small and medium-sized (SMEs) agri-food firms to be more innovative [8]. Innovation is seen by many authors as one of the most important factors in growing, surviving and enhancing competitiveness and entrepreneurship within the agri-food sector [9,10,11]. Traditionally, the agri-food is considered a low-tech intensive sector and the evidence supports the view that a firm's returns and growth depend on its capacity to innovate [12]. An innovative firm tends to be flexible and can be adapted to business environment easily leveraging opportunities better than competitors [13]. Innovation can provide the organization with the ability to stay one step ahead of the competition and, in a sense, to guide competition in the direction it chooses [14]. This is particularly so in SMEs agri-food organizations that typically lacks the staff and/or resources to devote specific individuals, let alone departments, to innovation management. There is a widespread recognition of the potential value of a framework of dimensions of innovation to an understanding of innovation activities and strategies and the development of innovation theory [15]. For the agri-food sector it has not been given due attention by researchers in innovation strategies [16,18,19,20]. Many authors claim that there has been little previous research into the innovation practices of food and drink sector, and, in particular, there is a lack of research on innovation dimensions within the agri-food sector [8,21]. There is no conclusive theoretical perspective on innovation dimensions [22] and the findings of large-scale global surveys published so far, reveal a significant variation in what is regarded as best practice in innovation management [23]. [24] suggest that the research on innovation performance in the agri-food sector would benefit from further development of its theoretical foundations. Given the importance of the agri-food sector on regional development, particularly with respect to the many small and medium-sized firms in Greece, more research is also recommended to how innovative are such firms in order to compete in world markets [8,24]. As [25] state, such literature reviews are appropriate and useful for identifying and summarizing evidence from earlier research.

In order to fill the above mentioned literature gap, the present study follows the suggestions of several authors for future research works on the agri-food sector. So, it contributes to the existing body of literature by (a) determining the innovation capability dimensions and (b) offering insights into the nature of innovation evaluating the level of implementation of innovation strategies and empirically validating their theoretical factorial structure in the agri-food companies operating in Greece under circumstances of financial crisis. EFA and CFA as well as descriptive statistics are applied for this purpose. The rest of the paper is structured as follows: in the first part, reviewing the literature, the dimensions of innovation are conceptualized and the research questions of the study are formulated. The methodology of a research study carried out in Greek agri-food companies is then described. This is followed by the analysis and the respective results. In the last part, the results are discussed and the final conclusions are presented including the practical implications,

2. Literature review and research questions

Innovation itself as a concept is multi-dimensional comprising various types [26]. It refers to all scientific, technological, organizational, financial and commercial activities which lead to, or are intended to lead to, the implementation of technologically new or improved products or services [27]. Innovation can be seen as one major determinant of the performance of firms, which would imply that the observed heterogeneity in performance among firms actually mirrors persistent differences in innovation behavior among firms [28]. Innovation has become a key issue at

various levels for firms, institutions and governments and its importance has motivated researchers to identify its various driving forces [29]. A recent survey of the Boston Consulting Group found that innovation was among the top three strategic priorities for 71% of companies [30]. Literature distinguishes different types of innovation and researchers have explored its classification in different ways [31,32]. Innovation can broadly be divided into technological (product and process) and non-technological (organization and marketing) innovations [27]. [21] also claim that product, process, marketing and organizational innovation are all domains of innovation. The third edition of the Oslo Manual extends the definition to include new organizational methods in business practices, workplace organization, or external relations [27]. In line with [27,33,34] distinguish between four main types of innovation, namely, product, process, organizational and marketing innovation.

- "Product Innovation", which involves a good or service that is new or significantly improved. This includes significant improvements in technical specifications, components and materials, incorporated software, user friendliness or other functional characteristics.
- "Process Innovation", involves a new or significantly improved production or delivery method. This includes significant changes in techniques, equipment and / or software.
- "Marketing Innovation", involves a new marketing method engaging significant changes in product design or packaging, product placement, product promotion or pricing.
- "Organizational Innovation", involves introducing a new organizational method in the firm's business practices, workplace organization or external relations [11].

In order to survive and maintain a competitive advantage, Greek agri-food firms must not only exploit their existing knowledge base but also continually integrate and develop new knowledge. Therefore, all innovation types are important for Greek agri-food. This study measured innovation performance using 19 items. The "product innovation" dimension is measured through measured variables that have been used in the previous studies of [36, 37, 38]. The "process innovation" dimension was measured through indicators that have been drawn from the studies of [35,36,26]. The measurement of the "marketing innovation" dimension adapted from the study of [38]. The "organizational innovation" dimension was measured through indicators that have been drawn from the studies of [38,39,40]. Based on the literature gap, the suggestions for future research as well as the above review of the literature, the following research hypotheses are formulated in order to be examined in manufacturing companies operating in circumstances of economic downturn and financial crisis:

RH1: The innovation strategies can be described by the dimensions of product, process, organisational and marketing innovation.
RH2: The innovation strategies are implemented to a high extent in agri-food sector.

3. Research methodology

A research study was carried out in the Greek agri-food companies using a questionnaire as the data collection method. All the measured variables of the questionnaire were adopted following a comprehensive literature review. The questionnaire was evaluated through structured interviews with professionals of agri-food companies and finally it was pilot tested proving its appropriateness and achieving the content validity of the constructs. The final version of the questionnaire consists of two parts. The first part includes questions on the demographic profile while the second part contains statements with regard to the innovation

practices companies adopt. The population consisted of agri-food companies from all sectors in Greece, in order to avoid biasing the final results. A sample of 800 companies was randomly selected from the list that was recorded in the database of ICAP (the largest business information and consulting firm in Greece). Respondents were asked to indicate the degree of their agreement or disagreement with these statements, using a seven point Likert scale, where 1 represented 'strongly disagree' and 7 represented 'strongly agree'. In total, 210 valid questionnaires were collected, yielding a response rate of 26.25%, which is acceptable compared to the response rate of the research studies of [32]. A range of statistical tests were performed on data obtained from the survey to assess the reliability and validity of the model as suggested by [41]. First, EFA was conducted, using SPSS 22.0, to check factor loadings of each item [42]. The most common method for measuring reliability of self-administered survey questionnaires involves estimating internal consistency. Cronbach's alpha coefficient is commonly used as a measure of internal consistency [43]. Moreover, CFA was applied to refine the resulting scales in EFA [42] and to determine if the number of factors and the loadings of the measured variables on them conform to what is expected on the basis of pre-established theory. In doing so, evidence of the construct validity of the theoretical factors is provided [44]. The level of implementation of the innovation strategies by the sample companies is determined through descriptive statistics.

4. Data analysis and results

The responding agri-food companies in the present research work are SMEs (92% less than 250 employees) 53% are food manufacturing companies, 33% process agricultural products and 14% manufacture drinks and beverages. The majority of the respondents – the companies' representatives (56%) stated that they were university graduates, 14 percent possessed a master's degree. Regarding the respondents' experience, 67% stated that they have been working in the food industry between 6 and 26 years, while 33% was limited up to five years of experience.

The mean values of the innovation dimensions range between 4.90 and 5.60. It is worth mentioning that the highest level belongs to 'process innovation' (5.60), followed by 'product innovation' (5.38) and 'organizational innovation' (5.10); and finally, 'marketing innovation' (4.90).

The indicators of the innovation dimensions identified in the literature were used of an EFA (principal component extraction method, varimax orthogonal rotation). The results of EFA revealed four factors (Kaiser-Meyer-Olkin = 0.923, Bartlett's test of Sphericity = 3191.755, p = 0.00, eigen-value>1, MSA>0.80, factor loadings >0.688), explaining 75.52% of the total variance. These factors were labelled in accordance with the four innovation dimensions identified in the literature, meaning product, process, organizational and marketing innovation. The examination of factor loadings indicated that all items loaded significantly on their expected constructs, and didn't demonstrate cross-loadings >0.35 on more than one latent factor. Thus, the19 items were used to run CFA and assess the fit of the measurement model and unidimensionality.

Following [32] CFA was conducted to examine the measurement model (figure 1) and the results confirmed the factors revealed by EFA. The fit indexes for the measurement model (see Table 1) indicated a good fit of the model to the data based on the recommended criteria: (χ^2/df) value <3.0, CFI, IFI, TLI and NFI > 0.9, SRMR <0.08, and RMSEA <0.08 [41]. Thus, it was concluded that all constructs were unidimensional. Once unidimensionality of the items was

established, it was then necessary to assess the reliability of the constructs [36]. Based on their values (Table 2) we conclude that the selected items reliably estimate the latent factors [42]. The construct validity of the latent factors is confirmed by evaluating the convergent validity (AVE > 0.623) [32]; discriminant validity (AVE > Corr2) [32] face-content validity (questionnaire review by experts in the field) and nomological validity (significant correlations among the extracted latent factors) (Table 1).

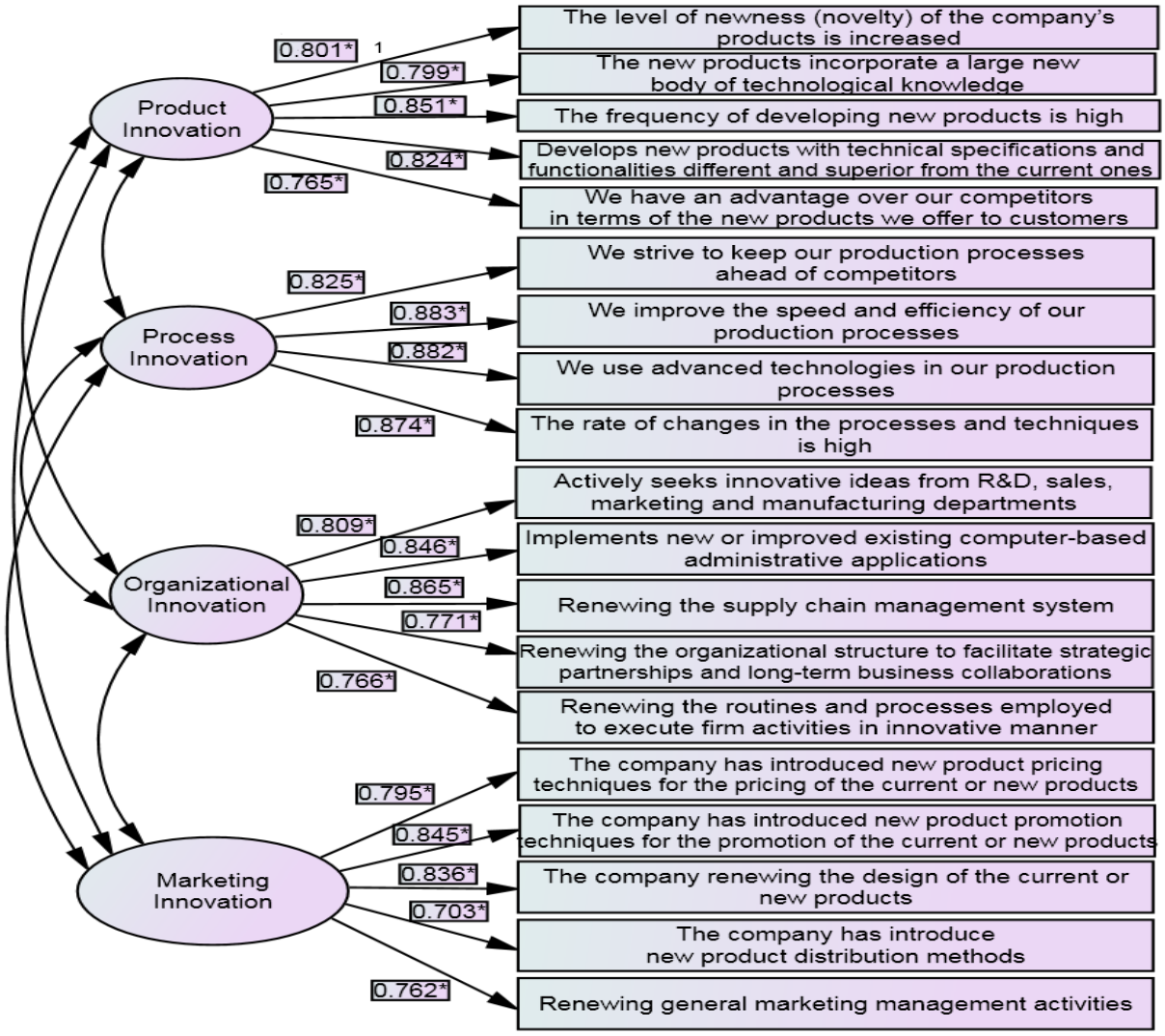

Figure 1. Confirmatory factor analysis. ∗Standardized regression weight.

Table 1 The fit indices of the overall measurement model

Goodness-of-fit statistics	Measurement model
Chi-square (χ^2)	177.664
Probability level	<0,001
Root Mean Square of Approximation (RMSEA)	0,067
Root Mean Square Residual (RMR)	0,075
Incremental Fit Index (IFI)	0,965
Tucker-Lewis coefficient (TLI)	0,954
Comparative Fit Index (CFI)	0,965
Chi-square/ degrees of freedom (χ^2/df)	1.931
Goodness of Fit Index (GFI)	0,908
Normed Fit Index (NFI)	0.931

Table 2 Constructs validity and reliability

Latent factors	Mean value	Std. Deviation	Cronbach's alpha	AVE*	(Corr)^{2**}
Product innovation	5.38	0.88	0.923	0,654	0,494
Process innovation	5.60	0.81	0.935	0,750	0,494
Organizational innovation	5.10	0.83	0.914	0,660	0,541
Marketing innovation	4.90	0.95	0.890	0,623	0,541

*: Average Variance Extracted (AVE) = $\Sigma\lambda_i^2$ / n, (number of items i = 1…..n, λi = standardized factor loading);
**: the highest squared correlation between the factor of interest and the remaining factors.

5. Discussion – Conclusion

The vast majority of the Greek agri-food companies participating in the present study are SMEs. Thus, the claims of [44] who state that the size of the Greek agri-food companies in general is quite small are confirmed. The present study provides also empirical evidence to support the underlying factorial structure of the innovation strategies identified in the literature. In other words, the present research findings strongly confirm that, as far as the agri-food companies operating in circumstances of financial crisis are concerned, the main dimensions reflecting the innovation strategies are indeed those that are described in the academic literature. More specifically, four distinct innovation dimensions are determined on the basis of overall innovation of agri-food companies. Two of these innovation dimensions are characterised by pure product- and process-oriented innovation activities; a third is based on the introduction of organisational innovations and a fourth is characterised by marketing changes.

Extending the analysis of innovation beyond the technological domain and introducing organisational and marketing dimensions provides a richer and more composite picture of companies' innovation strategies and capabilities. The four dimensions of innovation revealed are in accordance with the innovation dimensions defined by [27]. Similar to the present study, [33] are based on these four dimensions to study companies' innovation. The present study also reveals that, the agri-food companies do make remarkable efforts to adopt innovation. More specifically, considering the mean values of the innovation dimensions revealed, it is apparent that the sample of agri-food companies are familiar with practices concerning product, process, marketing and organisational innovation. It is also obvious that the innovation dimensions revealed do not approach the excellent level, which means that the sample companies are not, in practice, totally oriented towards innovation. So, there is still room for a

further increase in the degree to which the innovation strategies are implemented. The current crisis may be the reason why these companies cannot afford to fully innovate as far as their products, processes, marketing and organisational strategies are concerned. Although the effects of the crisis to business differ substantially across countries, sectors, businesses and types of innovation. In emerging Asia including Korea and China the crisis has shown its dynamism upgrading their role as players in the international innovation system, while in other countries (e.g. Greece) has revealed their pre-crisis weaknesses [45].

Similar to the present work, [46] measures the innovation rate of Greek manufacturing companies. According to his research, searching for product-specific information is more important for innovation than scanning more general market and technological information. The present study also contributes to the existing research by examining the four basic innovation dimensions. Previous researches focus on one or two aspects of innovation (product and/or process innovation). For example, the study of [47] within the manufacturing sector identified that SMEs are more engaged in process innovation than in product innovation. In addition, the study by [48] of Taiwanese SMEs within the manufacturing and service sectors revealed that technological and marketing innovation were the major types of innovation adopted within firms. In this study, the principal elements of four innovation dimensions giving a thorough assessment of a firm's innovative capability.

Thus, having a theoretical basis through its empirical validation, several useful points are revealed. More specifically, it builds on the previous work of [49,42,39,38,31] in terms of the operationalization of the relationships that exist between various innovation dimensions and a firm's performance. We extend the existing research by exploring issues that have been missing in prior studies. More specifically, a reliable and valid model has been developed demonstrating the existence of a broad concept that is determined by the successful implementation of innovative activities in agri-food companies. The empirical insights provided strongly support the validity of the innovation dimensions revealed. Although the economic business environment in which the Greek agri-food companies operate does not strongly support and promote innovation initiatives, it seems that the sample companies do innovate in all the dimensions revealed. The level of adoption of innovation in all the dimensions is satisfactory, though not, however, excellent. Thus, there is fertile ground available for the sample companies to further develop their innovation strategy in all the innovation dimensions.

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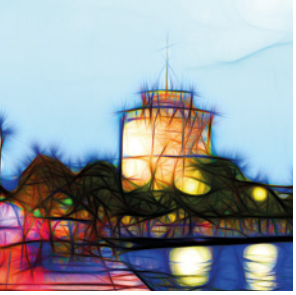

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ENTREPRENEURIAL OPPORTUNITY RECOGNITION: THE EFFECT OF THE LEARNING STYLE

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The present survey examines the effect of the learning style in the entrepreneurial opportunity recognition process. Drawing upon the notion of 'learning asymmetries', results from an online experiment, where respondents of different learning style assess pre-given opportunities, are presented and discussed. It naturally emerges from the present data (n=179) that the most abstract and creative opportunities are associated with the diverging learning style and thinking. Conversely, specific and more concrete problem solving opportunities, especially the technology transfer ones, appear associated with abstract conceptualisation and the converging learning style. The present outcome is in line with previous research on the relation between divergent thinking and creativity and between supply driven entrepreneurship and convergent thinking. Implications pertain to educating potential entrepreneurs and effective innovation team building within organisations.

Keywords
Entrepreneurial Opportunity, Entrepreneurial Alertness, Individual Differences, Learning Asymmetries, Learning Style

1. Introduction

The identification of entrepreneurial opportunities has been a central process in the study of entrepreneurship [1]. Opportunities can either exist in the market due to misallocation of resources or can be embedded in the market through a creative process [2]. In the first case, Kirznerian entrepreneurs discover entrepreneurial opportunities through their 'entrepreneurial alertness' [3, 4]. Beyond market conditions, scholars have addressed that the process of opportunity identification has an inherent psychological basis [5]. Unequivocally, why some, and not others, discover opportunities in a given socioeconomic environment can be partly rooted to individual differences. The learning style, a widely studied concept in managerial literature, can be one of them.

The traditional approach assumes that opportunities are identified through information asymmetries in the market. However, research by Corbett [6] and Dimov [7] has shown that not only information is important but also the way that information is transferred to individuals. When information transfer is consistent with the learning style of the individual [8] it is better exploited, and therefore, a larger number of opportunities is discovered. Else, the increase of

information leads to saturation and the individual can hardly exploit it. This result has led to consider the notion of 'learning asymmetries' in the opportunity identification process.
The previous research [6, 7] has also shown that pull-driven entrepreneurship is compatible with the diverging learning style while the push-driven with the converging one – a result that is also examined in the present article.
The present research extends the 'learning asymmetries' discussion adopting four different types of opportunity of Ardichvili, Cardozo and Ray [9], i.e. the abstract 'dreams' one, problem solving, technology transfer and business formation. These types demand different levels of creativity and the question is whether they are related with the four learning styles of the Kolb's [8] experiential learning theory. The findings will have certain implications on innovation adoption and empowerment of technology transfer through education and effective team building within organisations.

2. Theoretical background

The theoretical background of the present survey has been previously discussed in [10]. According to Ardichvili et al. [9], an entrepreneurial opportunity is a combination between value sought in the market, i.e. the product/service need, and the value creation capability, i.e. 'technology' of the new product/service. Depend on whether these two are defined or undefined, four types of entrepreneurial opportunities emerge shown in Table 1.

Table 1 Opportunity types classification of [9]

		VALUE SOUGHT	
		Unidentified	Identified
VALUE CREATION CAPABILITY	Undefined	I. 'Dreams'	II. Problem Solving
	Defined	III. Technology Transfer	IV. Business Formation

The 'Dreams' type is the most abstract and the Business Formation the most concrete. Problem Solving refers to situations where a need is well identified in the market without a specific product or service to cover it (i.e. demand-driven entrepreneurship) and Technology Transfer to the awareness of technologies for products or services but without identification of the need that they will cover (i.e. supply-driven entrepreneurship. Apparently, creativity is maximum in domain I and minimum in domain IV. Similarly, the Problem Solving domain is more creative than the Technology Transfer one since it allows for creative problem solving contrary to the second that requires more adaptive solutions [11].
The learning style concept follows the theory of Kolb, in 1984, for learning from experience (Figure 1). Sequentially, a person gets some concrete experience (CE) and reflects on that (RO) to reach an abstract conceptualisation of the experience (AC) and afterwards an active experimentation (AE) to test in practice her/his new knowledge and get a new experience (CE), and so on.

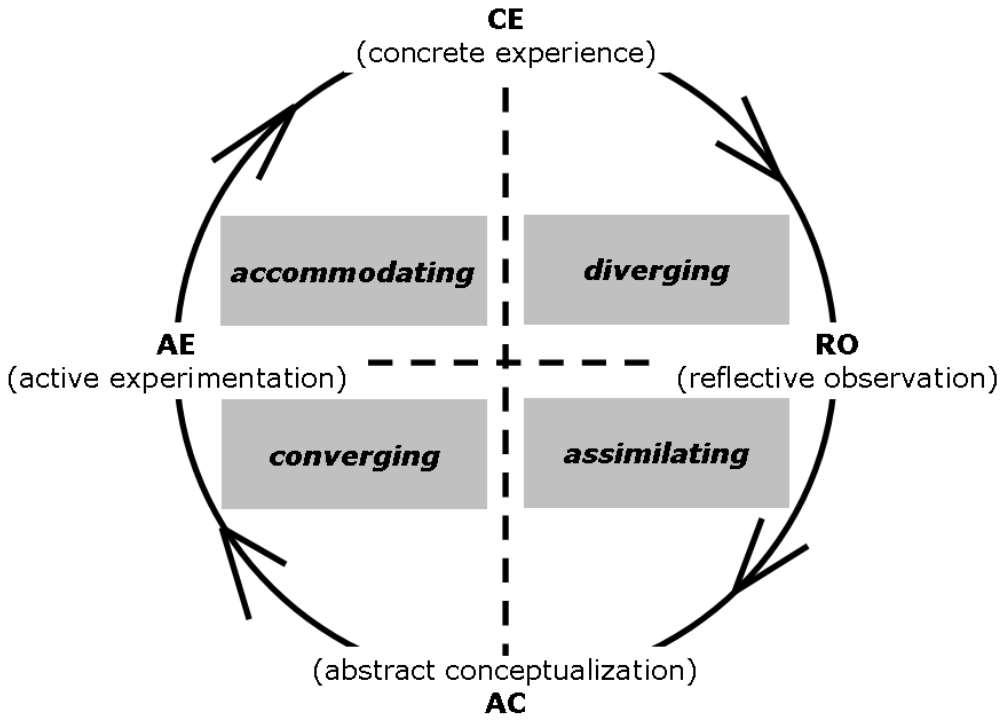

Figure 1 Kolb's (1984) model for learning from experience.

Depend on individual differences, some people can rely more on specific combinations of the four learning modes of Kolb (Figure 1), and thus, four learning styles emerge:

- the diverging style (CE – RO). Learners of this style are imaginative and emotional and tend to see concrete situations from many points of view.
- the assimilating style (RO – AC). Learners of this style organise information into logical forms and are more interested in theorising than in applying.
- the converging style (AC – AE). Learners of this style tend to find solutions to problems and to cope with technical tasks.
- the accommodating style (AE – CE). Learners of this style tend to try different experiments to solve a problem and they involve themselves in new experiences.

Kolb's learning style is measured through the KLSI v 3.1. instrument [12] used in the sequel.

3. Methodology

In order to examine possible correlations between the learning style and the types of entrepreneurial opportunities of [9] the following online experiment was performed. First, two

sets of entrepreneurial opportunities, and the respective creativity index (cr), were formed (Table 2). Each set encompasses two opportunities from each domain of Table 1.

Table 2 Opportunities adopted for the survey and creativity index.

	I. 'Dreams'	**II. Problem Solving**	**III. Technology Transfer**	**IV. Business Formation**
Set 1	Ia Painting	IIa Cottage exchange	IIIa Lasers	IVa Snack food
	Ib Writing novels	IIb Ordering system	IIIb GPS	IVb Intelligent trolley
Set 2	Ic Music	IIc Anti-theft systems	IIIc Expert systems	IVc Shoe store
	Id Cooking	IId Energy management	IIId RFID	IVd Smart pots
cr	4	3	2	1

Opportunities of type I are highly creative in different areas, of type II tend to confront emerging needs (i.e. cheaper vacations, improving ordering in restaurants, theft protection and effective management of energy resources), of type III consider possible uses of new technologies and of type IV consider ordinary business formation as franchising (snack food store, shoe store) or importing products (trolleys for super markets, smart pots for balconies). These opportunities ban be aggregated per set (I1, I2, II1, II2, III1, III2, IV1, IV2) and for both sets (I, II, III, IV).

Each individual respondent was initially asked to assess Set 1 opportunities in a 10 point scale, then her/his learning style was measured through the KLSI v 3.1. instrument [12], and afterwards, s/he was asked to evaluate the opportunities of Set 2. In this way n=179 replies were received. Cronbach's alpha for Set 1 was found .611, for Set 2 .685 and for aggregated Set1 and Set2 opportunities .721.

It is crucial for the validity of the experiment the adopted opportunities to be of comparable selectivity. If some of them are more striking than others, their selection will rather due to the opportunity itself than the learning style. In Figure 2, the selectivity of each opportunity of Table 2 is shown as well as aggregated sets. It is well known that the Problem Solving domain dominates [9] and the 'Dreams' one is the less selected; nonetheless, the differences have been minimised to the lowest degree due to two pilot tests and corresponding amendments before contacting the final sample. From the total responses, only 115 exhibited a clear preference among the opportunity domains (i.e. more than 5%).

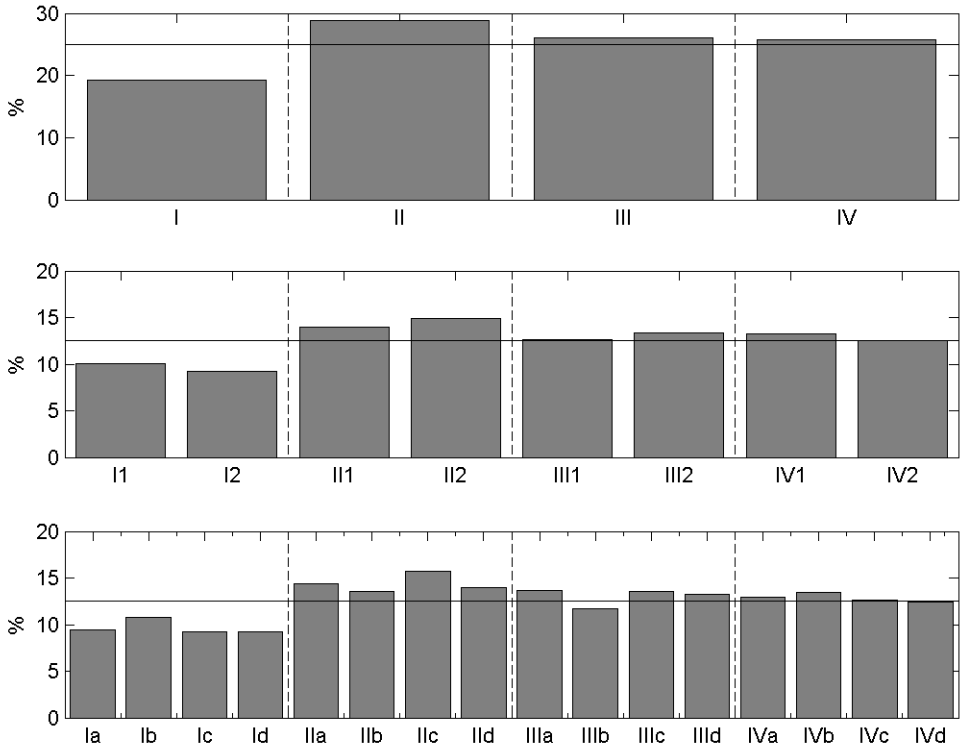

Figure 2 Selectivity of the opportunities adopted in the survey.

Finally, both opportunities and learning style are sensitive to gender (for the Kolb's learning style see [12]). Thus, stratified samples were used of N=94 respondents, 47 males and 47 females. In order to avoid reliance upon specific choices during stratification, the tests were repeated to 10 different and randomly stratified samples. The illustrated statistical results have been verified in more than 50% of the repeated tests.

4. Results

Pearson correlations for the opportunities of Table 2, and the aggregated sets, upon Kolb's learning dimensions (AE-RO, AC-CE) and learning modes (CE, RO, AC, AE) of Figure 1 are shown in Table 2. Pearson rho values have been omitted for the economy of space and only positive or negative, statistically significant correlations are shown. Due to the small variation among opportunity selectivity (Figure 2), correlations of the $p < .1$ level are also shown (marked by [a]). In the bottom line, Pearson correlations for the creativity index (cr) are also shown.

Table 3 Pearson correlations for the opportunities of the survey and the creativity index.

OPP	AE-RO	AC-CE	CE	RO	AC	AE
Ia		(–)	(+)		(–)	
Ib	(–)	(–)	(+) [a]		(–)	(–) [a]
Ic		(–)		(+) [a]	(–)	
Id				(–) [a]		
IIa						
IIb	(+) [a]			(–) [a]		
IIc		(+) [a]			(+)	
IId			(+) [a]			
IIIa				(–) [a]		
IIIb						
IIIc						
IIId		(+)			(+)	
IVa						
IVb		(+)	(–)		(+)	(+) [a]
IVc						
IVd						
I1		(–)	(+)		(–)	
I2		(–)	(+)		(–)	
II1						
II2						
III1						
III2						
IV1		(+)	(–)			(+)
IV2						
I		(–)	(+)		(–)	
II						
III						
IV			(–) [a]			
cr		(–)	(+)		(–) [a]	(–) [a]

[a] verified at the $p < .1$ level

4.1 Type I domain

The 'Dreams' type opportunities show negative correlation to the dimension AC-CE and negative to AE-RO (identified through Ib). The former relation remains in the aggregated variables whilst the latter vanishes. The results indicate clear preference to concrete experience learning mode and a weak one to reflective observation. Thus, the diverging learning style dominates within type I opportunities.

4.2 Type II domain

Statistically significant correlations in the Problem Solving domain are poorly identified. There is a clear preference ($p < .01$) in abstract conceptualisation (IIc) and indication ($p < .1$) for negative correlation to the reflective observation mode (IIb) that favours the converging learning style versus the assimilative one. Nonetheless, this outcome needs further examination.

4.3 Type III domain

In the Technology Transfer domain there is preference to abstract conceptualisation and active experimentation that verifies findings of [6, 7] that in this domain of supply-driven entrepreneurship the converging learning style dominates.

4.4 Type IV domain

In the Business Formation domain, only for opportunity IVb (i.e. intelligent trolley) statistically important correlations were found. These indicate preference to abstract conceptualisation and a weaker to active experimentation that favour the converging learning style. Nonetheless, this specific opportunity is very close to the ones of the domains II and III and with a similar result that needs further examination to be generalised for type IV opportunities.

4.5 Creativity index

Finally, the creativity index (cr) is positively correlated to concrete experience and negatively to active experimentation ($p < .1$) which indicates that creativity is associated with the diverging style and thinking.

4. Discussion and implications

The present online survey examined the relation between the learning style and the four domains of entrepreneurial opportunities of [9]. The data revealed strong correlation of the creativity index and the 'Dreams' domain of [9] with the divergent learning style and the concrete experience (CE) learning mode – a well-known relationship within the psychology domain (cf. [13]). Conversely, the Technology Transfer domain favours the converging learning style with emphasis on abstract conceptualisation (AC) and active experimentation (AE) learning modes. This outcome is in line with previous research of [6, 7] who found that the converging learning style is the most capable and appropriate to supply-driven entrepreneurship.

Implications of the present results concern both education and team building within innovating organisations. When teaching entrepreneurship to different disciplines, it is important to understand what kinds of ventures are expected to be founded as a result of teaching. For

example, engineers exhibit converging/assimilating learning style [12] unlike to art and literature students who exhibit a more diverging one. Despite all kinds of ventures can emerge from different discipline graduates, the teaching methodology and career encouragement are expected to attain more impact when associated to the predominant learning style of the population. Within organisations and towards effective innovation management, the building of innovating teams is far from been considered a trivial process. Depend on the nature of the product or services the organisation wills to develop, the consideration of the underlying learning styles of the individuals involved in the process of innovation could provide an essential tool and insight for the team performance. The present results contribute towards this direction supporting the idea of 'learning asymmetries' and they will be extended through future research in different countries and cultures.

Acknowledgements

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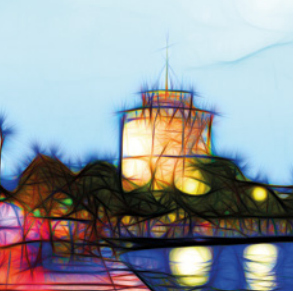

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EXPLORING THE GENDER GAP IN ENTREPRENEURIAL EFFICACY AND INTENTION IN GREECE

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The present survey examines the 'gender gap' in entrepreneurship for a Greek sample of 70 respondents aged from 25 to 60 years old. Based on previous studies, seven research hypotheses are tested toward gender differences in entrepreneurship. The expected prevalence of male entrepreneurs, or nascent entrepreneurs, was validated as well as the elimination of self-confidence differences in entrepreneurial tasks by educational interventions. The results about entrepreneurial orientation between genders appeared similar indicating that the way that females tend to start businesses does not vary from men's. Besides, the expected higher need for independence than financial rewards for females was not verified. The study also revealed gender differences in important others' opinion (normative beliefs), competiveness and conception of the role of entrepreneur that can be attributed to the Greek culture. The latter features are the most resistant to changes from educational interventions compared with entrepreneurial self-efficacy and knowledge.

Keywords
Entrepreneurial Intention, Entrepreneurial Orientation, Entrepreneurial Self-Efficacy, Gender, Important Others

1. Introduction

Female entrepreneurship, as a distinct form of business venturing, has been a field of academic inquiry for the last two decades [1-4]. There can be many barriers for women around the world to found and run businesses with correspondent socioeconomic effects. The population of female entrepreneurs is observed less than the masculine one [5, 6] – a situation that tends to change due to the massive fostering of entrepreneurship especially in developed countries [7]. A series of underlying factors aim to explain the female business rates and nature, some of them related to the local culture and tradition. In general, entrepreneurship education is thought bridging the 'gender gap' in entrepreneurship with evidence that entrepreneurial courses affect more the female population [8-9].

A recent (2014) European report on female entrepreneurship across Europe-28 [10] verified the expected picture in Greece showing that female entrepreneurship is half of the masculine

one, i.e. female entrepreneurs about 10% within the active labour force with male about 20%. Hence, the first research hypotheses to be tested in the present survey concern the population of female Geek entrepreneurs and nascent entrepreneurs:

H1: Male percentage exceeds the female one in becoming entrepreneurs.

H2. Male percentage in nascent entrepreneurship exceeds the one of females.

Female motivation in business is also considered different than males' [7, 12]. Women focus on local businesses, often in specific market sectors, that offer flexibility in work conditions and better response to family duties [7]. Women' expectations from business are also considered lower than men's [11] who are thought to enter global businesses for wealth creation. Women also appear to operate in enterprising groups and alliances [11]. Therefore, the following hypotheses concern female motivation and expectation from business:

H3. Females target the local market and males the global one.

H4. Females start businesses with more partners.

H5. Female expectations from businesses favour independence than financial rewards.

Research findings indicate that female entrepreneurship exhibits the previous attributes due to female's lower confidence on own business abilities and knowledge [8, 13]. Especially for the Greek population [14], females recognise business planning and entrepreneurial knowledge (that they do not have) as more important compared to communication skills (that they have) contrary to males. However, educational interventions attain high impact amongst females [15]. Considering entrepreneurial self-efficacy [16-17] that determines the entrepreneurial intention, females appear less confident than males but after attending entrepreneurial courses the 'gender gap' disappears. This has led many scholars to propose entrepreneurship education as a means to empower female entrepreneurship [9]. The following research hypothesis will be tested:

H6. Females exhibit lower entrepreneurial self-efficacy than men. After attending entrepreneurial courses, the difference blunts.

Entrepreneurial self-efficacy concerns the control beliefs in theory of planned behaviour [18]. Following this theory, normative beliefs also determine the targeted intention and behaviour. Hence, the influence of important others' opinion about business venturing will also be examined toward the gender dimension:

H7. Important other's opinion about business venturing is more positive for men than women.

Since entrepreneurship education is expected to affect more the females and to eliminate the 'gender gap', all previous research hypotheses (H1-H7) are examined towards the gender.

2. Methodology

In order to test the research hypotheses, an online survey was conducted using a structured questionnaire. The data were collected from February to April 2017.

2.1 Questionnaire

A 104 item, multi-scale questionnaire was delivered online to a Greek population. Some of the scales are a part of an instrument developed by the Illinois State University in 2010 for examining the impact of entrepreneurship education worldwide [19]. The used scales are illustrated in Table 1.

Table 1 Structure of the 104 item, multi-scale questionnaire.

I. DEMO	**II. NASC**	**III. EOR**	**IV. IO**	**V. IOS**
Gender	Entrepreneurial intention	Entrepreneurial orientation	Important others' opinion	Significance of others' opinion
Entrepreneur	6 items, [20]	2 items	6 items, [21]	6 items, [21]
Age	**VI. EMP**	**VII. ESEF**	**VIII. AUT**	**IX. OUTCOME**
Level of education	Empathy	Entrepreneurial self-efficacy	Sense of autonomy	Outcome of the new business
Entrepreneurship education	7 items, [22]	20 items, [17]	16 items, [23]	4 items, [24]
Taking lessons	**X. GSEF**	**XI. IDENTITY**	**XII. SESEF**	
Employment	General self-efficacy	Entrepreneurial identity	Social entreprene-urrial self-efficacy	
Work experience	10 items, [25]	6 items, [26]	14 items,[27]	

2.2 Sample

The questionnaire was delivered online and received 116 answers, from which, n=70 were complete and were included in the analysis. The sample consists of 54.3% males (38 respondents), 43% entrepreneurs (30 respondents), with ages from 25 to 60 years old (mean=39.67, s.d.=8.7). The sample also consists by 54.3% of persons who had attended entrepreneurial courses (of different kind), 64.3% of full time employees and 25.7% of self-employed, 34.3% with BSc and 41.4 with MSc, and from 0 to 36 years work experience (mean=15.6, s.d.= 8.688). Concerning the entrepreneurial intention of non-entrepreneurs (NASC scale, [20]), 16 were found nascent entrepreneurs and 24 were found with unidentified entrepreneurial intention. The majority of the respondents were from the Peloponnese region in Greece.

2.3 Internal reliability of scales used

From the n=70 responses analysed, the following Cronbach's alpha were calculated for each separate scale of the instrument All alpha values are especially high except the one of scale EMP (Table 2).

Table 2 Internal reliability of scales used (n=70)

SCALE	ITEMS	α	SCALE	ITEMS	α	SCALE	ITEMS	α
II. NASC	6	.868	VI. EMP	7	.018	X. GSEF	10	.881
IV. IO	6	.874	VII. ESEF	20	.956	XI. IDENTITY	6	.952
V. IOS	6	.803	VIII. AUT	16	.815	XII. SESEF	14	.932
			IX. OUTCOME	4	.892			

All variables were found non-normally distributed (except item 4 of ESEF and item 5 of IDENTITY). Hence, non-parametric statistical tests are used where applicable.

3. Results

In Table 3 the gender dependence of the scale items is illustrated using either parametric t or non-parametric Mann–Whitney U tests. The sub-sample consists of 38 respondents (out of 70) who had attended entrepreneurial courses.

For categorical variables, chi square tests show gender dependences on entrepreneurial intention (NASC scale, $\chi^2(3, n = 70) = 11.962$, $p = 0.008$) and behaviour (entrepreneur, $\chi^2(1, n = 70) = 10.597$, $p = 0.001$) within the total sample. Males exceed females in both entrepreneurial action (7 women entrepreneurs and 23 males) and nascence (5 women and 11 men). The prevalence of males' percentage toward entrepreneurial behaviour is also verified in the sub-sample (entrepreneur, $\chi^2(1, n = 38) = 9.079$, $p = 0.003$) but the result for the entrepreneurial intention becomes marginal at the 95% confidence level (NASC scale, $\chi^2(2, n = 38) = 5.675$, $p = 0.059$). Hence, both hypotheses H1 and H2 about entrepreneurship rates are supported where entrepreneurship education blunts the gender difference in entrepreneurial intention.

In contrast, no gender dependence was verified regarding the number of partners and the target market of the new company (EOR scale) – i.e. statistically unimportant chi square tests. Hence, hypotheses H3 and H4 on entrepreneurial orientation of females are rejected.

Furthermore, the gender dependence of the rest scales of Table 1 is shown in Table 3. Remarkably, there is no gender dependence on empathy (EMP), general self-efficacy (GSEF) and social entrepreneurial self-efficacy (SESEF).

Table 3 Dependence of variables on gender. t-test or non-parametric Mann–Whitney U test were used.

Scale	Item	Total Sample		Sub-sample	
		Statistic	p	Statistic	P
IV. IO	1	U=398.5	.012	U=101.5	.020
	2	U=423	.025	U=263.5	.009
	4	U=400.5	.013	–	–
	6	U=430	.031	–	–
V. IOS	2	–	–	U=262.5	.009
VI. EMP	–				
VII. ESEF	3	U=384	.007	–	–
	4	U=420	.025	–	–
	5	t=2.365	.021	–	–
	7	U=356.5	.002	–	–
	9	U=405.5	.015	–	–
	10	U=386	.008	–	–
	12	U=405.5	.014	U=108.5	.035
	20	U=426.5	.028	t=2.291	.028
VIII. AUT	3	U=406	.012	–	–
	5	U=340.5	.001	U=92	.009
	8	U=433	.029	t=2.111	.042
IX. OUTCOME	1	U=354.5	.002	t=2.489	.018
	2	U=381.5	.005	U=97	.015
	3	U=417.5	.014	U=109.5	.038
	4	U=399	.011	–	–
X. GSEF	–				
XI. IDENTITY	1	U=347.5	.001	t=2.118	.041
	3	U=417	.019	t=2.048	.048
	4	U=390	.008	–	–
	5	t=2.648	.010	–	–
	6	U=412.5	.015	–	–
XII. SESEF	–				

3.1 Important others

For the IO scale, four items exhibit dependence on gender but only the first two remain gender dependent in the sub-sample (Table 3). Items 4 (other relatives) and 6 (familiar people) appear to have neutral opinion for females (in the total sample) contrary to males that have positive ones. These dependences disappear in the sub-sample. Concerning parents' (item 1) and spouses' (item 2) opinions about starting a business, they appear more positive for males – a result that remains unchanged in the sub-sample of entrepreneurially educated respondents. The result is that males are more encouraged from important others to become entrepreneurs. The significance of others' opinions (IOS scale) shows only one dependence

in the sub-sample for item 2. According to this, males declare their spouse's opinion as more important compared with females. Findings from the IO scale support hypothesis H7.

3.2 Entrepreneurial self-efficacy

Concerning the entrepreneurial self-efficacy, 8 items show gender dependence in the total sample but only two (items 12, 20) remain gender dependent in the sub-sample (Table 3). These items concern 'supervise employees' and 'read and interpret financial statements' where males appear more confident. The rest items that show gender dependence only in the total sample concern 'identify the need for a new product or service', 'design a product or service that will satisfy customer needs and wants', 'estimate customer demand for a new product or service', 'estimate the amount of start-up funds and working capital necessary to start a new venture', 'get others to identify with and believe in my vision and plans for a new venture', 'networking' where males feel more confident.
The results support hypothesis H6 validating that females feel less confident about entrepreneurial tasks but after attending relevant courses or seminars the 'gender gap' disappears.

3.3 Other scales

Gender dependencies were found for the scales of autonomy (AUT), the business outcome (OUTCOME) and the entrepreneurial identity (IDENTITY). From them, the OUTCOME scale is the most dependent on gender in the total sample and the result remains unchanged in the sub-sample of entrepreneurially educated respondents.
Specifically, in item 3 of the AUT scale ('I often do my own thing') males agree more than females but the dependence on gender disappears in the sub-sample. For items 5 ('It is important that I do my job better than others') and 8 ('when another person does better than I do, I get tense and aroused') males agree more in both total sample and sub-sample exhibiting a more competitive character.
For the items 4, 5, 6 of the IDENTITY scale, i.e. 'when I think about it, the term "entrepreneur" would fit me pretty well', 'I am always thinking about becoming an entrepreneur', 'It is important for me to express my entrepreneurial aspirations', the males agree more but the gender dependence disappears in the sub-sample. For items 1 ('I often think about becoming an entrepreneur') and 3 ('Becoming an entrepreneur would be an important part of who I am'), the males' positive prevalence is observed in both samples indicating a gender difference about the role of entrepreneur as a part of the personality. However, entrepreneurship education affects women since this difference tends to become marginal in the 95% confidence level of the sub-sample.
Finally, all items of the OUTCOME scale are gender dependent: 'financial rewards (personal wealth, increase personal income, etc.)', 'Independence/Autonomy (personal freedom, be your own boss, etc.)', 'Personal rewards (public recognition, personal growth, to prove I can do it, etc.), 'Family security (to secure future for family members, to build a business to pass on, etc.)'. Only the last one becomes gender-free in the sub-sample. Nonetheless, in all items males agree more than females a result that does not support hypothesis H5 about higher independence versus financial rewards for females.

4. Conclusions

The present study discussed the 'gender gap' in entrepreneurship for a Greek population. From the research hypotheses, four (H1, H2, H6, H7) were verified and three (H3, H4, H5) were rejected. The latter pertain to the entrepreneurial orientation of females, i.e. the size of partnerships, the targeted market and the expectations from the new businesses, that do not statistically vary from the males' ones. The validated hypotheses indicate that gender differences do exist but they are highly influenced by educational interventions.

The greater number of male entrepreneurs along with the more positive opinion from others for male entrepreneurship, the high importance of spouse's opinion and the more competitive nature for males (AUT scale) could result from the local culture. Notably, the previous findings are poorly influenced from entrepreneurship education. According to dimensions of national cultural indices of Hofstede [28-29], the Greek culture has a medium ranking (57%) masculine index and high risk avoidance index (100%). In such a cultural environment, males are expected to be more active in risk taking (entrepreneurship) and more competitive towards making their initiatives viable and their efforts secure.

The results for entrepreneurial identity (IDENTITY scale) are in line with previous research [6] that found that females do not feel very comfortable with the term 'entrepreneur'. Males find the role of 'entrepreneur' more inherent to their personality compared to women who express a more neutral opinion. However, this result is influenced by entrepreneurial courses indicating that this is a 'weak' gender difference susceptible to education and changes in the socioeconomic environment.

Finally, the results on entrepreneurial self-efficacy are the most striking about the role of education on eliminating gender differences in entrepreneurship. Remarkably, no differences were found in general self-efficacy and social entrepreneurial self-efficacy whilst gender dependencies on a few entrepreneurial tasks were easily ruled out through entrepreneurial courses. Only the 'supervision of employees' and elements of financial literacy seem to still trouble more the females than males. In sum, the present results need to be extended in a broader Greek sample since they contribute towards further empowerment of female entrepreneurship in Greece.

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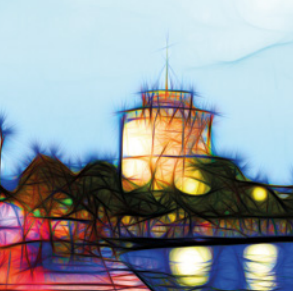

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COMPETENCES, DRIVERS AND BARRIERS TO ENERGY EFFICIENT AND SUSTAINABLE OPERATIONS – EUROPEAN CASE STUDY

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One of the most important challenges for current supply chains is environmental protection. Due to external pressures, companies start to take into account the environmental impact of their operations and make informed decisions on their processes and supply chains, becoming more energy efficient and environmentally sustainable. However although the energy efficiency and sustainability are usually perceived as important, the implementation practices varu in different countries due to identified barriers and drivers. The aim of this paper is to analyse the required competences as well as barriers and drivers for implementing energy efficient and sustainable operations in a cross-country comparative approach. This study will contribute to the green supply chain management literature, especially in the area of comparative research, which are scarce. The study presented in the paper was performed within the TrainERGY (Training for Energy Efficient Operations) Project. The project consortium comprises of academic institutions, SMEs and industrial association from four European countries. The data for the analysis have been gathered with a use of an online survey in Poland, UK, Italy and Greece. Kruskal–Wallis one-way ANOVA on ranks was used in order to examine the between country differences in the analysed areas.

Keywords
Barriers, Competences, Drivers, Energy Efficiency, Sustainability

1. Introduction

One of the most important challenges for current supply chains is environmental protection. The scarcity of natural resources, declining biodiversity or air, soil and water pollution, push organisations to include environmental issues to their business goals. The precautionary principle [1] and the pollution prevention approach [2] show main direction of acting for business organisations. The precautionary principle says about the need to protect environment in any case to anticipate the possible risk and avoid harmful consequences. In

broader sense it could be used in decision making process of planning business activities without additional environmental risks. Pollution prevention is more than working in line with minimum environmental requirements. It assumes environmental friendly choices that minimise the negative effects on environment such as: waste reduction, energy efficient operations or water saving etc. The challenge for current enterprises seems to be the shift from theoretical consideration about the environment protection to practical implementation and embedment into strategy.

The environmental sustainability agenda has a commitment to reduce Greenhouse Gas Emissions by 80-95% by 2050, with reference to 1990 levels. In such a context, companies across Europe will be increasingly assessed on their environmental performances, as 23% of CO2 global emissions is attributed to business operations.

Due to this external pressure, businesses should start to take into account the environmental impact of their operations and make informed decisions on their processes and supply chains, becoming more energy efficient and environmentally sustainable.

However although the implementation of practices towards energy efficiency and sustainability are usually perceived as important, the relevance, commitment and advancement in use, varies in different countries due to identified barriers and drivers.

The aim of this paper is to analyse the required competences as well as their barriers and drivers for implementing energy efficient and sustainable operations in a cross-country comparative approach. This will contribute to the green supply chain management literature, especially in the area of comparative research, which are scarce.

2. Practices Supporting Energy Efficiency and Sustainable Operations

Companies can perform different practices in their supply chains that would support energy efficiency and sustainability of their operations. This view is supported through publications [3, 4], survey research results [5, 6, 7, 8, 9], case studies [10, 11] and comparative studies on the green supply chain practices [12].

There are many different types of practices supporting energy efficiency and sustainable operations [13]. In general, they refer to relationships with suppliers (both procurement and collaboration with suppliers on product and processes improvement), relationships with customers (mainly product development and collaboration in the field of distribution logistics) and internal logistics within a single company.

Table 1 Practices supporting energy efficiency and sustainable operations.

Categories of practices	Examples of practices
Practices in relationship with suppliers [12, 13, 17, 18, 19]	Cooperation with suppliers for environmental objectives e.g. reduce packaging, environmental assessment of first and second tier suppliers (e.g. criteria, audits), suppliers' ISO14000 certification, implementing just-in-time strategy, Providing suppliers with environmental friendly specifications, supplier support and education (supplier green development), joint ventures.
Practices in relationship with customers [15, 16, 17, 18, 19]	Cooperation with customers for: eco-design (design for: reduction or elimination of environmentally hazardous materials, remanufacturing, recycling, reuse, resource efficiency), cleaner production, green packaging, using less energy during, transportation, product take back, reverse logistics.
Internal practices [4]	Design of environmental friendly/low-carbon products and processes (e.g. production, logistics), eco-labelling, investment recovery (sale of excess inventories/material, scrap and used materials, excess capital equipment), commitment of top management to green supply chain management, trainings and internal communication on environmental issues, cross-functional cooperation for environmental improvements e.g. pollution prevention programs, environmental management systems, ISO 14001 certification, environmental performance evaluation and reports, reverse logistics: remanufacturing, recycling, reuse.

Research results indicate that successful implementation of practices supporting energy efficiency and sustainable operations are important, as they are strictly connected with supply chain performance and determine [5, 20, 21]:

- Environmental performance (i.e. reduction of air emission, waste water, solid wastes, decrease of consumption for hazardous/harmful/toxic materials, decrease of frequency of environmental accidents).
- Operational performance (on the one hand: decrease of cost for energy consumption, decrease of environmental fees, fines but on the other hand: increase of investment, operational cost, green purchasing costs).
- Economic performance (i.e. improved punctuality of deliveries, minimised inventory, improved product quality).

For successful implementation of the practices mentioned above a wide scope of competences (both organisational and personal) are required and they will be discussed further in the paper.

3. Competences Required for Implementing Energy Efficient and Sustainable Operations

The issue of sustainability in supply chain is used to manage social and environmental aspects directly related to specific competences and knowledge of managers, required to understand and correctly implement noneconomic goals into the company and its supply chains. This problem can be characterized in three dimensions: Competence aspects, like: conceptualization of competences, key competences needed, methods of acquiring competences etc. [22, 23]; Different kinds of competences required, such as: system-thinking, normative, strategic, anticipatory and interpersonal competences [24]; The integration of sustainability in management education [25] and in universities [26].

In order to identify competences required for implementing energy efficient and sustainable operations used in the research an analysis of different sources has been performed covering: literature mentioned in the previous section, the existing curricula offered in selected EU countries and databases specialized in the higher education web marketing [27].

For the purpose of this research 64 programmes have been analysed in the countries covered by the project and beyond, which resulted in 282 main topics identification, that further have been allocated into 18 specific competences areas. Additionally, the specific competences areas belonging to the same category have been grouped in 5 categories (C1 – C5) as shown in table 2.

Table 2 Competences required for implementing energy efficient and sustainable operations.

Category	Specific competences areas
C1 Technologies, databases and specific software tools for reducing processes' environmental impact	1. Technologies for reducing energy consumption 2. Technologies for reducing pollution 3. Technologies for reducing consumption of raw materials 4. Technologies for reducing waste 5. Tools and Decision Support Systems for supporting environmental decisions 6. Database management systems for supporting environmental decisions
C2 Strategic orientation in terms of Green Innovation, Purchasing, Marketing	7. Green Innovation 8. Green Purchasing 9. Green Marketing
C3 Green internal and external operation management	10. Green internal operations management 11. Green external operations management
C4 Environmental principles, regulations, certifications and activities reporting	12. Environmental regulatory frameworks 13. Environmental certifications 14. Audit principles 15. Reporting activities
C5 Definition of objectives and performance indicators, Checking and Interventions Planning	16. Definition of environmental objectives and environmental performance indicators (EPIs) 17. Measuring Environmental Performance Indicators (EPIs) 18. Interventions identification

3. Research Methodology

The research was conducted in 4 European countries (Poland, United Kingdom, Italy and Greece) within an EU funded project – TrainERGY: Training for Energy Efficient Operations (http://www.trainergy-project.eu/). The aim of the project is to develop a virtual learning environment that would firstly develop competences required for implementing energy efficient operations and secondly provide support in: monitoring and assessing companies current decision-making strategies in relation to environmental concerns, adopt low carbon decision-making patterns, develop long-term plans for energy efficiency and environmental sustainability of their supply chains.

In order to develop the business support environment correctly the project consortium undertook a study on the following aspects:

- Relevance of the identified competences required for implementing energy efficient and sustainable operations for the surveyed companies (variables R1 – R5, presented in table 3).
- Stage of implementation / advancement in use of the competences required for implementing energy efficient and sustainable operations within the surveyed companies (variables S1 – S5, presented in table 3).
- Barriers to implementing energy efficient and sustainable operations (variables B1 – B11, presented in table 4).
- Drivers for implementing energy efficient and sustainable operations (variables D1 – D12, presented in table 5).
- Between countries differences in the examined aspects: relevance, stage, barriers and drivers (Kruskal–Wallis one-way ANOVA on ranks H-Value presented in tables 3, 4 and 5; between country differences analysis results presented in table 6).

The content of the study was designed twofold: the competences required for implementing energy efficient and sustainable operations were identified as described in the previous section. Whereas barriers and drivers selection was mainly based on Zhu and Sarkis et al. approach as it have been widely tested internationally, supported by other recent studies [28, 29].

For all surveyed aspects (relevance, stage, barriers and drivers) a 5 point Likert scale was used, ranging from 1 (minimum) to 5 (maximum).

The study was conducted from October to December 2016. A total number of 134 valid responses was collected with the following distribution among the participating countries: Poland – 56 questionnaires, United Kingdom – 25 questionnaires, Italy – 28 questionnaires and Greece – 25 questionnaires. The survey can be further characterized by:

- Business sectors, including: manufacturing (26,1%), construction (23,1%), retail/commerce (11,9%), food and winery (10,4%), transportation/logistics (9,0%), healthcare services (6,7%) and other (12,7%).
- Size of the entity, described by the number of employees, including: Under 25 (41,0%), 26 to 50 (22,4%), 51 to 250 (26,1%) and more than 250 (10,4%).

Construct reliability (overall and for every country, as presented in tables 3, 4 and 5) was assessed using Cronbach's alpha, where unidimensionality of a block of p variables Xn can be quantified when they are all positively correlated (when alpha >0.7) [30].

Furthermore in order to examine the between country differences in required competences, as well as barriers and drivers, a non-parametric test (Kruskal–Wallis one-way ANOVA on ranks) was used [31].

4. Results and conclusions

The results demonstrate that there are significant differences between the analysed countries (table 3, 4 and 5, H-values for R1 – R5, S1 – S5, B1 – B11, D1 – D12):

- The relevance of competences required for implementing energy efficient and sustainable operations is lower in Poland (PL), comparing the United Kingdom (UK), Italy (IT) and Greece (GR).
- Stage of implementation / advancement in use of the competences required for implementing energy efficient and sustainable operations is similar for PL, UK and IT, being different (higher) for GR.
- The barriers to implementing energy efficient and sustainable operations in PL, IT, GR and partly UK are similar, whereas the drivers are significantly different in UK, comparing with PL, IT and partly GR.
- There are no significant differences in all analysed aspects (in most of the cases) between UK, IT (except drivers) and GR.
- The results for PL identified the highest number of differences (comparing to UK, IT and GR) in all analysed aspects.

The analysis provides empirical support for the development of meaningful competence development schemes for employees and managers, as well as guidelines for successful implementation of energy efficient and sustainable operations across Europe.

However the results, especially the identified differences, also suggest that there is a degree of institutional / external pressures which determines the extent to which organisations in certain countries engage in, and support the drive towards energy efficiency and operational sustainability. European companies are subjected to a system of common compulsory actions, through the effects of European Union environmental regulations, however the cultural differences between countries, industrial sectors, and between firms of different sizes generate different pressures for developing sustainable strategies [32, 33]. With increasing globalization, and harmonisation in regulatory standards in European countries, there is a need to improve understanding for operational sustainability and enhanced environmental performance.

The findings from this research are also applicable to cross-cultural and cross-sectoral settings, and expand the existing institutional and supply chain management theoretical models with new variables, viable at the European level. The results of the survey is one of the few attempts to address the competency gap mitigation for European companies and highlight to policy makers the necessary actions required to create an environment that promotes energy efficient and sustainable business activities.

The study has also an important contribution towards understanding the relationship between drivers and the ability for companies to pursue opportunities for improving environmental performance, and the extent to which they are constrained by the identified barriers.

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Appendix – research results (tables)

Table 3 Competences required for implementing energy efficient and sustainable operations (Mean, standard deviation, Cronbach's Alpha, Kruskal–Wallis one-way ANOVA on ranks – observed H-value).

Competences required for implementing energy efficient and sustainable operations	PL				UK				IT				GR				Kruskal–Wallis ANOVA	
	Relevance		Stage		Relevance		Stage		Relevance		Stage		Relevance		Stage			
	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	H-value	
C1 Technologies, databases and specific software tools for reducing processes' environmental impact (R1, S1)	2,29	1,17	2,27	1,29	4,48	0,65	2,76	0,83	4,25	1,17	2,75	1,21	3,80	0,87	3,08	0,81	R1	64,01483*
																	S1	10,71828*
C2 Strategic orientation in terms of Green Innovation, Purchasing, Marketing (R2, S2)	2,48	1,29	2,41	1,37	4,64	0,49	2,72	0,84	4,14	1,01	2,93	1,25	4,00	0,65	3,24	0,72	R2	57,96299*
																	S2	10,98475*
C3 Green internal and external operation management (R3, S3)	2,57	1,45	2,43	1,36	4,52	0,51	2,80	0,87	3,82	1,16	2,21	1,17	3,96	0,79	3,24	1,05	R3	40,03034*
																	S3	11,87722*
C4 Environmental principles, regulations, certifications and activities reporting (R4, S4)	2,75	1,53	2,64	1,61	4,48	0,51	3,84	0,80	4,32	1,06	3,46	1,29	3,96	0,61	3,28	0,74	R4	35,61841*
																	S4	13,56818*
C5 Definition of objectives and performance indicators, Checking and Interventions Planning (R5, S5)	2,43	1,57	2,36	1,53	4,60	0,50	2,96	0,73	4,07	1,25	2,89	1,40	3,96	0,89	3,08	0,95	R5	40,41325*
																	S5	9,194559*
Cronbach's α	0,942	0,942			0,808				0,935				0,933				Cronbach's α	
Cronbach's α – relevance	0,947	0,896			0,916				0,937				0,895				Cronbach's α – relevance	
Cronbach's α – stage	0,886	0,866			0,740				0,934				0,927				Cronbach's α – stage	

* denotes p<0,05 for which there is significant difference between the analysed groups

Table 4 Barriers to implementing energy efficient and sustainable operations (Mean, standard deviation, Cronbach's Alpha, Kruskal–Wallis one-way ANOVA on ranks – observed H-value).

Barriers to implementing energy efficient and sustainable operations	PL		UK		IT		GR		Kruskal–Wallis ANOVA
	M	SD	M	SD	M	SD	M	SD	H-value
B1 Operational costs	3,79	1,14	4,60	0,58	3,89	1,34	3,84	0,80	12,70846*
B2 Training costs	3,23	1,32	4,36	0,49	3,11	1,13	3,52	1,08	19,73155*
B3 Costs of improvement implementations	3,79	1,04	4,36	0,64	3,68	1,16	4,00	0,76	6,970641
B4 Lack of know-how/intellectual capital	2,96	1,35	3,72	0,84	3,36	1,22	3,80	1,22	10,01647*
B5 Lack of technology support	2,84	1,37	3,64	0,95	2,86	1,24	3,64	1,08	7,799593
B6 Weak commitment of top management	2,95	1,33	3,52	1,19	2,96	1,29	3,24	1,39	3,998811
B7 Employee resistance to change	2,79	1,33	3,76	0,78	2,96	1,37	3,20	1,50	9,265153*
B8 Lack of suppliers commitment	2,88	1,38	4,28	0,68	2,96	1,32	3,60	1,22	22,23225*
B9 Not enough pressure from the market	3,04	1,29	3,96	0,93	3,18	1,25	3,68	1,18	11,95359*
B10 Time needed to implement new green solutions	3,09	1,31	3,64	0,95	3,36	1,13	4,00	0,82	9,702885*
B11 Lack of short term benefits	2,95	1,52	3,72	0,98	3,46	1,23	3,24	1,45	5,191335
Cronbach's α 0,911	0,885		0,826		0,888		0,944		Cronbach's α

* denotes p<0,05 for which there is significant difference between the analysed groups

Table 5 Drivers for implementing energy efficient and sustainable operations (Mean, standard deviation, Cronbach's Alpha, Kruskal–Wallis one-way ANOVA on ranks – observed H-value).

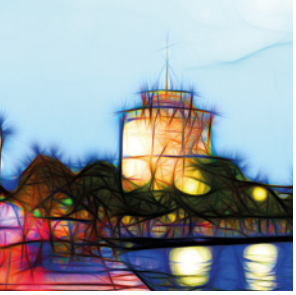
Drivers for implementing energy efficient and sustainable operations	PL		UK		IT		GR		Kruskal-Wallis ANOVA
	M	SD	M	SD	M	SD	M	SD	H-value
D1 Market pressures from local customers	2,61	1,37	4,64	0,64	3,54	1,45	3,56	1,26	36,85445*
D2 Market pressures from international customers	2,64	1,52	4,56	0,92	3,54	1,43	3,96	1,14	34,34206*
D3 Governmental regulations and laws	3,41	1,30	4,72	0,46	3,68	1,28	4,16	0,85	24,66692*
D4 Competitor's green strategies and improvements	2,75	1,24	4,72	0,46	3,18	1,33	4,04	0,98	47,11359*
D5 The role of professional group activities	2,57	1,08	4,72	0,46	3,04	1,37	3,76	1,09	53,83631*
D6 Operational cost reduction through energy efficiency	3,45	1,22	4,72	0,46	3,82	1,28	4,00	0,87	24,18965*
D7 Corporate social responsibility strategy	2,86	1,29	4,76	0,44	3,46	0,92	4,20	0,87	48,87937*
D8 Management commitment to environmental improvements	3,09	1,28	4,76	0,44	3,61	1,07	4,12	1,05	36,98412*
D9 Global environmental challenges	2,80	1,42	4,48	0,92	3,43	1,10	4,08	0,76	36,98412*
D10 Benefits and savings	3,84	1,28	4,72	0,46	4,07	0,90	4,32	0,85	12,00569*
D11 Pressures from local society	2,36	1,20	4,56	0,77	3,29	1,21	3,68	1,18	49,03478*
D12 Pressures from investors	2,64	1,47	4,68	0,56	2,96	1,40	3,44	1,39	35,51327*
Cronbach's α 0,948	0,934		0,797		0,893		0,941		Cronbach's α

* denotes p<0,05 for which there is significant difference between the analysed groups

Table 6 Between country differences in required competences, drivers and barriers to implementing energy efficient and sustainable operations.

	UK	IT	GR
PL	C1R1, C2R2, C3R3, C4R4, C5R5 C4S4 B1, B2, B7, B8, B9 D1, D2, D3, D4, D5, D6, D7, D8, D9, D10, D11, D12	C1R1, C2R2, C3R3, C4R4, C5R5 D1, D11	C1R1, C2R2, C3R3, C5R5 C1S1, C2S2, C3S3 B4, B10 D2, D4, D5, D7, D8, D9, D11
	C1S1, C2S2, C3S3, C5S5 B3, B4, B5, B6, B10, B11	C1S1, C2S2, C3S3, C4S4, C5S5 B1, B2, B3, B4, B5, B6, B7, B8, B9, B10, B11 D2, D3, D4, D5, D6, D7, D8, D9, D10, D12	C4R4 C4S4, C5S5 B1, B2, B3, B5, B6, B7, B8, B9, B11 D1, D3, D6, D10, D12
UK		B2, B8 D1, D2, D3, D4, D5, D6, D7, D8, D9, D10, D11, D12	B1 D1, D5, D12
		C1R1, C2R2, C3R3, C4R4, C5R5 C1S1, C2S2, C3S3, C4S4, C5S5 B1, B3, B4, B5, B6, B7, B9, B10, B11	C1R1, C2R2, C3R3, C4R4, C5R5 C1S1, C2S2, C3S3, C4S4, C5S5 B2, B3, B4, B5, B6, B7, B8, B9, B10, B11 D2, D3, D4, D6, D7, D8, D9, D10, D11
IT			C3S3 D2
			C1R1, C2R2, C3R3, C4R4, C5R5 C1S1, C2S2, C4S4, C5S5 B1, B2, B3, B4, B5, B6, B7, B8, B9, B10, B11 D1, D3, D4, D5, D6, D7, D8, D9, D10, D11, D12

Underline denotes variables for which there are significant differences between the analysed groups. Grayed-out cells denote variables for which there are significant differences between the analysed groups



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OPEN DATA HACKATHONS: A STRATEGY TO INCREASE INNOVATION IN THE CITY

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Open data and hackathons are new and important research areas. Hackathons are designed to enhance the use of open data which will benefit government and citizens. The main challenge of organizing a competition or a hackathon is to persuade developers to provide innovative ideas, which can be transformed into to applications for the public. According to researchers, there are many motivations in order to participate in a hackathon. However, there is limited research highlighting the benefits of the contest or hackathon, for both governments and participants. To maximize the potential of these events, organizers must follow specific guidelines; thus a model describing the steps for hackathons to become a driver of innovation in a city's ecosystem is proposed. Following previous models for hosting hackathons and based on previous experience of organizing successful hackathons in the city of Thessaloniki, a model for designing innovation and open data hackathons are proposed. Results show the phases, which are necessary to be followed in order to organize a hackathon as well as the advantages of its hosting. The proposed model implies a more robust impact which enables collaboration and commitment between the actors in a city's ecosystem towards reaching the goal of improving their quality of life. As more open data hackathons are hosted in Thessaloniki and used as drivers of innovation, organizers need to collaborate with universities, governments, application users and other actors of the city's ecosystem. Therefore, the quality of these events will be increased, as well as the quality of applications and citizens' life.

Keywords
Hackathon, Innovation, Open data, Strategic Planning

1. Introduction

Open data and hackathons are new and important research areas [3]. Hackathons are designed to enhance the use of open data which will benefit government and citizens. Governments wish to engage citizens and developers who work on producing an application using open data which are promoted and distributed through contests. By organizing them, governments hope to inform the public about the importance and the use of open data as well as to encourage the development of new applications [12].

Hackathons are events where people come together in order to collaborate on developing and launching a new or completed application, which will solve problems faced by public [7]. The main phases of these events are the Planning and Organizing, the Execution of the event and the Post-event phase. Hackathons are often combined with prize money for participants and they typically inform, promote and persuade public of the use of open data and their value [7, 11-12, 19]. The main challenge of organizing a competition or a hackathon is to persuade developers to provide innovative ideas, which can be transformed to applications for the public.

According to researchers, there are many motivations in order to participate in a hackathon. Motivations such as fun, learning and collaboration persuade developers to explore ideas that involve high market and technical uncertainties [7]. However, there is limited research highlighting the benefits of the contest or hackathon, for both sponsoring governments and hackathon participants [1]. To maximize the potential of these events, organizers must follow specific guidelines; thus a model describing the steps for hackathons to become a driver of innovation in a city's ecosystem is proposed. Researchers have noticed that city administrations should strategize user participation in hackathons [6].

Following previous models for hosting hackathons and based on previous experience of organizing successful hackathons in the city of Thessaloniki, a model for designing innovation and open data hackathons are proposed. The proposed model implies a more robust impact which enables collaboration and commitment between the actors in a city's ecosystem towards reaching the goal of improving their quality of life.

Hosting hackathons is an excellent way for empowering and engaging citizens to be aware of how their active involvement can positively improve the quality of life in their cities by developing new applications. As more open data hackathons are hosted in Thessaloniki and used as drivers of innovation, organizers need to collaborate with universities, governments, application users and other actors of the city's ecosystem. Therefore, the quality of these events will be increased, as well as the quality of applications and citizens' life. The contribution of this paper is twofold. First it expands the current knowledge about models in organizing hackathons as well as the benefits and the challenges of this process and second it proposes a model which helps organizers to strategically plan these events.

The reminder of the paper has been structured as follows: The next section describes work related with open data hackathons. Section 3 presents the proposed model. Finally, conclusion and suggestions for future research conclude the paper.

2. Open Data Innovation Hackathons

The significance and the value of open data have been acknowledged by researchers. Open data increases the economy of a city by enhancing the development of new businesses and services [5]. The main objective of a good government is to interact with the open government ecosystem. The actors who participate in this ecosystem are government, users or citizens, business, civil sector organizations and public managers. Governments interact with the others actors of the ecosystem to find out what types of government data and information is required and what data or government information services count as openness. As a result governments engage to the ecosystem entrepreneurs who try to expand business opportunities by using government data. Cities which distribute their data have more benefits

than others that do not. Also, developers can benefit by using open data in order to develop new services which create value for citizens and private or public actors [2].
In contrast, researchers have named the obstacles and challenges which incommode the use of open data. Challenges and problems refer to the capability of users and application developers to realize the opportunities stem from open data, unfamiliar business idea in order to utilize data to develop new business, lack of technical readiness to use data sources due to complex data format or interfaces, weakness to derive appropriate data sources for application purposes, lacking availability of regional data sources for creating applications for local services, unclear licensing of open data, legal issues such as data which are not ceremoniously open by decision of owner, technical obstacles concern data publishing platforms, guarantee of quality and credibility of data, lack of local data and utility of open data [13-14]. Education, experience from users, citizens and enterprises and maintenance from government are required in order to use open data [17].
Public organizations distribute open data to mobile and web applications which present useful content based on assembled and synthesized open data for easy use in order to enhance the exertion of open data by the public and face these challenges [15]. Future predictions regarding the extent of the development of services and applications which will be developed based on open data show an increase in the use of data [16].

2.1 Motivations and Benefits

Governments aim to support citizens and developers to participate in contests in order to develop an application using open data which they will promote and distribute through the competitions [1]. Governments host these competitions in order to inform citizens of the significance and the use of open data while also supporting the development of new applications. These competitions continue to be the predominant strategy for enhancing openness and economic growth provided through civic open data [1, 4].
Although contests and hackathons are popular, they are a new research area thus surveys are limited. Researchers should focus their attention on these events. Researches which study the benefits of the contest or hackathon, for both sponsoring governments and hackathon participants are limited. The purpose of these hackathons is to inform, promote and persuade public of the use of open data and their value. The sponsoring government aims to involve participants for the development of an application for public which will meet the market needs by hosting hackathons displaying a specific challenge or topic (such as tourism) [1]. Thus, the major challenge of hosting a competition or a hackathon is to convince developers to provide innovative ideas, which can be transformed to applications for the public. Hackathons are often combined with prize money for participants in order to motivate them to participate. As open data contests or hackathons have the same purpose and developers create applications based on open data, governments are obligated to make available free and easily open data [1].
Some motivations for developers which stimulate them to participate are training, fairness of the judgment system, collaboration and new knowledge [7]. Also, fun and enjoyment, intellectual challenge, status and reputation, user need, professional and personal identity, autonomy, learning and skills development, money, extrinsic reciprocity, signaling and career Concerns motivate them to participate in the innovation contests [18]. Finally, fun, learning

and collaboration persuade developers to explore ideas that involve high market, technical uncertainties [3, 8, 11] and encourage developers to participate in hackathons.
Johnson and Robinson [1] concluded that previous contests have distributed open data in order to learn new skills to participants and to create innovative applications. An interesting finding comes from Lee et al. [4], who conducted interviews in participants in 8 cities in Europe, claims that contest organizers reasoned money as an important motivator for participants, providing a foundation for them to expand development of their applications.

2.2 Hackathon Preparation

Hackathons provide many opportunities to organizations because they can test their new products and services as well as generate new ideas. As the technology which is considered to be provided to developers is considered to be a strong motivation to participate because they will learn something new and useful, they are energized to develop new applications. In the final stage, all hackathons have a reward structure and a set of criteria by which the applications are evaluated in order to distribute the awards [7]. However, hackathons should be organized strategically because organizers have to provide developers with much more infrastructures except for technological tools [6]. Table 2 presents the models which have been suggested by researchers in order to organize successful hackathons. These models include different stages but they are similar. First, organizers have to define the goals of the contest. Second, they have to communicate the event in order to increase participations. Then, they have to prepare the technological tools and the required infrastructure which they will provide to developers. As Information Technology (IT) helps businesses to develop new services it also supports developers to develop innovative services using open data [9-10]. Next, the event execution is followed and finally it is evaluated.

Table 2 Models for organizing hackathons.

Phases	**Activities**
Rosell et al., 2014 [7]	
1. Leadership Support	Definition of goals and objectives of the hackathon
2. Publicizing the Event	Announcement and invitations to encourage participation
3. Timing	When the hackathon will be held
4. Social Media and Team Building	Online forum where participants could correspond with each other
5. Preparing the Participants	Technical infrastructure
6.Hackathon day Infrastructure	Preparation of networking facilities and small breakout conference rooms
Komssi, 2015 [11]	
1. Ideation and team building	Collection of ideas
2. During the hackathon	Technical infrastructure Food and Coffee
3.Post-Hackathon	Participants have to decide how their idea could be further developed
Alba et al., 2016 [12]	
1.Outlining the basis	Definition of goals and objectives of the hackathon
2.Planning and organizing	Definition of challenges Logistics Sponsors' funding Marketing campaign
3.Hackathon execution	
4.Post-event follow up	

The applications which are developed during the competitions remain as property of the developers. They have the opportunity to sell them to the general public once the competition is over. In Helsinki, there are sales channels of mobile applications and online markets (e.g. iTunes and Ovi Store) which support the developers of mobile applications to sell their developed services without significant investments in distribution and permit for practically unlimited upscaling of the usage of the applications [2]. Developers who participated in a contest in Amsterdam hoped that citizens would be informed of the civic apps through municipal websites or that the city organizers would present participating solutions [4].
By the way, Juell-Skielse et al. [18] conducted a survey in participants of open data competition and they concluded that despite the fact that more than 80 % of the teams planned to expand their service further, only one third had achieved the development, after the competition. This could be explained due to the limited support to developers by organizers after the contest. Lee et al. [4] claimed that when the organizers in open data

competitions were informed of developers' motivations, they could involve entrepreneurs and venture capitalists on the panels of judges. Moreover, they could organize competitions and closing ceremonies that involved potential funders. Some developers had many opportunities because they could discuss about their applications, present them in real-time and get funding.

3. Proposed Strategic Model for Organizing Open Data Hackathons in Thessaloniki

Hackathons organized by the municipality of Thessaloniki are valuable for the growth of the city. They encourage developers to generate new ideas and create innovative applications. Also, they boost the development of new public services. Furthermore, open data hackathons give the opportunity to developers to expand their applications further and create innovative startups. On the other hand, developers who participate in hackathons have many benefits such as cooperation with others, learning new skills and development of startups.

In order to achieve the above goals the city's council could host these events strategically. In Figure 1 the proposed model for hosting themed hackathons is presented.

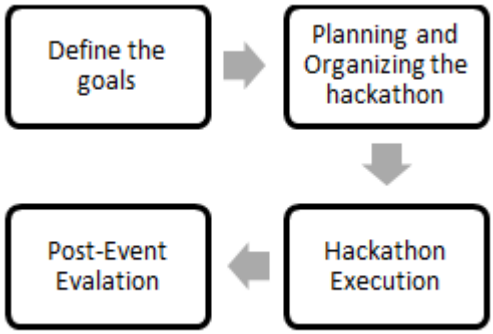

Figure 1 The proposed model for hosting themed hackathons.

In the first phase the organizers define the purpose and the objectives of hackathons. As these events are themed, each one has a different concept and developers have to create applications according to it. In the next phase organizers have to obtain sponsors to finance the hackathons, the venue and IT requirements and the catering. They have to plan the registration platform, to decide who the judges are and develop a marketing strategy in order to promote the event. The next phase concerns the day of the execution of hackathon. On this day, organizers provide developers with technical infrastructure and food, in order to create their applications. After many hours of programming, they present their applications to judges and the best applications win prizes. The last phase when a survey for participants should be performed in order to give feedback for the improvement of the event. Then the organizing committee should evaluate the feedback in order to understand what went well, what did not and what can be improved. Unfortunately, this phase is still ignored by organizers.

The developed applications should be further supported by the organizing committee after the end of the event. Developers participate in hackathons because they hope to expand their

applications and create innovative startups. Until now, organizers do not promote these applications through marketplaces and they do not help developers to find entrepreneurs or mentors to support them to start a new business. The organizing committee could involve entrepreneurs in the judgement committee in order to mentor developers and get funding for them to developers.

4. Conclusions

By organizing hackathons, governments hope to inform the public about the importance and the use of open data as well as encouraging the development of new applications [12]. The main phases of these events are the Planning and Organizing, the Execution of the event and the Post-event phase. The main challenge of organizing a competition or a hackathon is to persuade developers to provide innovative ideas, which can be transformed into applications for the public.

Having followed previous models for hosting hackathons and based on previous experience of organizing successful hackathons in the city of Thessaloniki, a model for designing innovation and open data hackathons is proposed. The proposed model implies a more robust impact which enables collaboration and commitment between the actors in a city's ecosystem towards reaching the goal of improving their quality of life. Results show that city's hackathons are not strategically organized so the organizing committee face difficulties in order to motivate developers to participate. Also, they haven't got feedback by them and as a result they do not understand the motivations of developers and they cannot improve the events.

Future research should be done in order to improve the hosting of these competitions. There is a lack of researches studying the motives which stimulate developers to participate in hackathons, as well as the benefits and challenges from the use of open data. Although researchers have presented how to organize contests, the motivations and the understanding of the significance of open data as well as the benefits of their use haven't still been investigated. Furthermore, whether developers decide to continue or abandon the applications has to be further examined. To maximize the impact of open data hackathons, organizers must follow specific steps; thus a model describing the phases for hosting hackathons in order to boost innovation in a city is proposed. This model should be further evaluated as well as the mechanisms and the motivations so that city administrations who have supported tit, will be able to strategize user participation.

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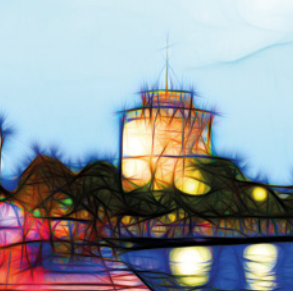

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IMPROVING THE COMPETITIVENESS OF GREEK SMES THROUGH OPEN INNOVATION: BENEFITS, BARRIERS AND KEY SUCCESS FACTORS

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This research explores the concept of Open Innovation for Greek SMEs. The goal is to present a holistic view of Open Innovation in order to allow its successful adoption by Greek SMEs, rendering it a useful strategy capable of improving their innovative capability and consequently their competitiveness. The objectives set for this goal were first, the display of benefits that Greek SMEs already realize, second, the identification of potential barriers to Open Innovation and third, the presentation of key aspects, crucial changes and recommendations for the successful adoption of Open Innovation by Greek SMEs. The aspects of Open Innovation that are considered for this research occurred through review of existing literature. The aforementioned objectives are not discussed in the Greek SME context in any of the existing publications. Consequently, it is of great importance to present the status of Open Innovation in Greece, to assess its potential for Greek SMEs, and to propose certain actions that facilitate its effective adoption. This study adopts an exploratory approach by using a qualitative method based on interviews with experienced people in Open Innovation. The significance of this study lies to the importance of innovation for the achievement of competitiveness, and to the ability of Open Innovation to resolve issues like the limited investments into R&D, the lack of specialized knowledge among the workforce, and the capital restrictions due to the financial crisis, which comprise the unfavorable business environment of Greece.

Keywords
Barriers, Benefits, Key Success Factors, Open Innovation, SME

1. Introduction

As Porter [1] cited, *Innovation* describes the development or discovery of new and better ways to compete in an industry, and their utilization in order to create competitive advantage for a firm.
Innovative ideas can derive from both the internal and the external environment of a firm. Consequently, a firm can earn profits by transferring its innovative ideas to the external environment. This exchange of knowledge among businesses with the purpose of creating

competitive advantage is called *Open Innovation*. The term was introduced by Chesbrough in 2003 [2] and has gathered a lot of interest and a wide variety of research since.

2. Literature Review

2.1 Small and Medium-Sized Enterprises

This category includes enterprises with staff headcount less than 250 people, and with either turnover or balance sheet total less than €50 million and €43 million respectively [3]. SMEs represent 99% of all businesses in the European Union [3], a percentage that renders them important for economic growth and job generation.
These enterprises are described by both positive and negative characteristics. On the positive side, they are flexible and more adaptable to market changes [4], [5], they are efficient, innovative, and close to the customer, and finally they usually target small, more specialized markets [4], [5], [6]. The negative characteristics of SMEs emanate from their size and usually include the lack of know-how, skills, and capital, as well as difficulties in growth and scale, along with limited bargaining power [4], [5], [6], [7], [8], [9].

2.2 Importance of Open Innovation for SMEs

In modern economies, economic growth is closely related to innovation [5]. Additionally, the increased globalization brings even more competition to local markets [6]. As a result, SMEs that wish to stay competitive and ensure their long-term existence must engage in innovative activities [5].
Many researchers stress the importance of Open Innovation for SMEs, due to its contribution to overcoming barriers to innovation. Both [7] and [10] mentioned that due to the degree of specialization in their activities, SMEs must interact with knowledge networks for R&D, access to complementary resources, exchange of knowledge, and commercialization and marketing activities.
More specifically, as it will be later presented, an open model of innovation is capable of reducing the lack of skills and qualifications of personnel, the limited know-how, the limited R&D capabilities, the issues with capital, funding and risks, the difficulties in growth and scale, and finally the limited bargaining power.

2.3 Advantages of an Open Innovation Model

Existing literature shows that Open Innovation can provide advantages in various areas of business and operations.
First, it has proven to benefit the innovative performance of SMEs by improving the costs, quality, and speed of innovation [11], by allowing them to focus on their core competencies through outsourcing of their secondary activities [8], by increasing their bargaining power through strategic alliances [8], and finally by providing access to complementary assets through partnerships [8].

Furthermore, Open Innovation has proven to benefit the marketing processes of SMEs, and especially their sales and channels. More specifically, through Open Innovation, SMEs are able to discover new markets and satisfy more customer segments [12], to transfer technologies [12], and to share their risks and reduce the liability of scale [8]. In general, their social capital is enhanced [8], [13], and the development of commercial and industrial liaisons reinforces the positioning of the firm in the market [8].
Finally, through Open Innovation, an SME can create products that otherwise would not be possible, and can also respond to rapid changes with the assistance of its partners [11].

2.4 Barriers to Successful Adoption of Open Innovation

Barriers to Open Innovation can be divided into Cognitive, Behavioural (Cultural), and Institutional (Structural) [14]. Cognitive barriers represent the difficulties that arise due to the lack of know-how and skills of personnel, and due to the ineffective communication inside a firm. Cultural barriers concern the reluctance and fear of employees regarding exchange of know-how and intellectual property. Finally, structural barriers include a strict organizational chart, locating insufficient resources to Open Innovation [15], not establishing sufficient internal communication routes [15], and legal issues [15], [16].

2.5 Key Factors for the Successful Adoption of Open Innovation

There are certain crucial preparations that need to take place before the adoption of Open Innovation by an SME. First, the activities of the firm that are critical for its future must be identified, in order for those that are not to be made available for outsourcing [11]. Accordingly, the firm's distinctive competencies and capabilities must be mapped, in order for the bottlenecks and weaknesses to be recognized [11]. Finally, along with the barriers to Open Innovation that concern the internal environment of the firm, the ways in which innovation occurs in the industry must be acknowledged as well [11].
Apart from the aforementioned preparations, there are certain key practices that are closely linked to the success of Open Innovation. First, literature cites the importance of top *Management*'s commitment to Open Innovation, as well as the weight of its guidance and vision [17]. Furthermore, another aspect that has a crucial role in the facilitation of innovation is the *Structure* of the firm. Authors stress the need for flexible communication routes and cross-functional interfaces that will allow the smooth flow of information everywhere across the firm.
The third but one of the most important aspects for Open Innovation's success is the firm's *Culture*. An innovative culture has a business model approach to technological development [12], it turns its focus to customers' needs and embraces ideas from outside the firm [18]. Additionally, an innovative culture ensures collaboration among employees, it embraces risk [18], and supports failure as long as the firm learns from past mistakes [19].
Proper management of *Human Resources* is another key success factor. Due to the limited number of employees that comprise an SME, lack of skills and qualifications occur frequently. Therefore, apart from the exchange of technology, a firm must consider the alternative of exchanging knowledge in the form of researchers [12]. Moreover, training is necessary in

order to ensure that employees adopt the aforementioned characteristics of an innovative culture [12].

The mapping of a firm's distinctive competencies and technologies is critical for the formulation of its strategy. It will allow the firm to outsource its non-distinctive and focus on its core activities, as well as to commercialize its unused intellectual property, acquiring the necessary capital for the development of its core competencies.

Furthermore, developing key innovation metrics is considered one of the main necessary capabilities for Open Innovation [18]. It will allow the firm to measure the success of this strategy and to observe its course over a period of time.

Finally, in the open model of innovation, a firm should strive to increase its social capital by enriching its network of prospective liaisons. In order to succeed in this endeavor, a firm should possess knowledge of the market, of its potential business partners, and of where to find them. Also crucial is for a firm to be able to maintain such a network of partners and to recognize a profitable business fit.

3. Methodology

The investigation of Open Innovation in the Greek SME context is a topic that has attracted little prior research. Additionally, there was no publication found presenting all the organizational aspects that relate to the effective adoption of Open Innovation by an SME. As a result, this study required the review of various existing publications on Open Innovation, and the simultaneous development of categories that depict the aforementioned organizational aspects. The development of categories from data is a characteristic of the *Grounded Theory* methodology according to [20], with the sole difference that, in this case, existing literature represents the primary data.

The second step was to locate people with experience on Open Innovation, obtain their knowledge, compare it to current literature, and possibly add new important findings. In conclusion, for the purpose of remaining open in various insights, the research has an *exploratory nature*.

Since the goal was not only to compare and contrast findings with existing theory, but also to discover which Open Innovation practices are significant for Greek SMEs, this research adopted an *inductive approach*. The questioning routes that were used, were not standardized, and for the purpose of discovery, the research process was interactive and not restricted to certain answers. According to [20], the above required a *qualitative research design*.

During the interviews, some key questions were used in order for all the objectives to be covered, but space for additional questions and explanatory conversations was left in case of new findings. The above characteristics are part of *semi-structured interviews* and describe a *mono method qualitative study* [20]. The interviews were based on a guide which was formed according to the most important organizational aspects that relate to Open Innovation. The interviewees were Executive Officers, Research Directors, and Researchers of companies that engage in Open Innovation activities. Consultants who have experience on this field were also interviewed, allowing a degree of generalizability of the findings. The selection of this sample served the purpose of theory building which is necessary for Grounded Theory.

Research Questions

The research questions that were used in order to obtain the data necessary for the achievement of the objectives were:

1. What are the benefits that Open Innovation can offer to Greek SMEs?
2. What are the barriers that a Greek SME could possibly face in the process of adopting Open Innovation?
3. What are the Key Factors for successful adoption of Open Innovation, and which of them concern Greek SMEs most?

Research Limitations

One limitation of this research concerns the number of participants. Due to time limitations and the difficult period of July-August, the positive responses were restricted to thirteen, although more than a hundred companies and consultants were approached.
Another limitation that relates to participation is that Open Innovation is a relatively young term, unpopular to the Greek business environment. As a result, extensive research was required in order to locate SMEs that have already adopted Open Innovation practices, though without recognizing the term. This fact, frequently required further explanation and description that in many cases were a prohibitive factor.

4. Conclusions and Recommendations

4.1 Conclusions

First, regarding the benefits of Open Innovation for Greek SMEs, findings show that exchange of know-how increases the innovative capabilities of the company rendering it more competitive in global markets. Furthermore, partnerships and strategic alliances allow an SME to discover new markets, develop new products and satisfy more customer segments. They also allow for B2B sales and exploitation of synergies, increasing their overall business. Another significant benefit of partnerships is the ability to take advantage of economies of scale and to combine resources, strengthening the SMEs' competitiveness in new markets.
Being a part of an Open Innovation network, cultivating a certain public image and recognition for the company's skills, creates in turn even more opportunities for cooperation. Finally, this network of potential partners extends even more the ability of the company to develop demanding products and respond successfully to increased needs of clients.
Unfortunately, all the aforementioned benefits lie beyond a huge wall of difficulties, which comprises from an unfavorable external environment that impedes efforts for partnerships and innovation. Greek business culture is another obstacle that usually leads to introvert companies, reluctant to seek assistance from the outside, and consequently unable to cope with their competition. The cognitive and structural barriers to Open Innovation are products of this culture that fails to aid the adoption of a more open model that will provide opportunities and competitive advantage to Greek SMEs.
On a positive note, findings show that the Greek financial crisis has led SMEs to become more extroverted, to cooperate with companies in other markets, to learn from them, and consequently to become more competitive. It derives that timing is crucial in order to present

to Greek SMEs more data regarding an open model of innovation, and more alternatives to become competitive.
The establishment of Open Innovation as a popular term among Greek companies, will serve as a common language that will allow for a better understanding of innovation, of partnerships and alliances, and of the barriers that all the parties of a partnership must overcome.
Because of the aforementioned barriers, the practices that will enable a company to realize the benefits of Open Innovation serve the purpose of creating a more "social" company, one that is open to the external environment.
Findings show that this change can be a result of both external and internal forces. In the first case, increased needs, demanding clients, innovative partners, or a change of generations are usually the factors guiding change. In the second case, management and employees who understand innovation are those who drive change.
Managers with an understanding of how innovation works, understand also the concept of a company which is more open to the external environment. As a result, they are able to change the culture towards innovation, to change the organizational structure in order to facilitate Open Innovation, to inspire and utilize innovative employees, to guide the activities of the company through a successful strategy, and to recognize opportunities and cultivate strong relationships with partners.
Important actions that will lead the cultural change of employees are the adoption of an entrepreneurial, risk-taking behavior, the enhancement of business thinking through training, and the encouragement and reward of actions that express the open model of innovation.
The structure that SMEs should strive for is a flexible, fluid structure, with direct communication routes among employees, and increased autonomy. This structure enables speed, cooperation and exchange of ideas among employees, and prepares the ground for innovation. Additionally, apart from business training, formal structures are necessary in order to record and evaluate new ideas and opportunities.
A crucial factor for the success of Open Innovation is the strategic management of intellectual property. It is important that the company have clear targets, and an understanding of its core competencies, those that provide its competitive advantage. This will allow the outsourcing of secondary activities and the transfer of ideas to partners, resulting in reduction of costs and actualization of gains and opportunities.
Thus far, it has been mentioned that extroversion and recognition of the company's needs and capabilities are two of the most important steps towards identification and fruition of opportunities for cooperation. The other two steps are the careful consideration of the people who will participate in these activities and will guide Open Innovation, and the continuous observation of the market and the competition.
Recognition of the company's needs is also necessary in order to establish a healthy relationship with a possible partner. These needs must be clearly communicated to the other party for a win-win partnership to occur. Win-win situations, synergies, and complementarity are factors that contribute to a stronger and more beneficial cooperation. Obviously, nurturing the needs of partners, assisting them, understanding them, and being clear regarding expectations, are useful practices in every business relationship.

4.2 Recommendations

The conclusions drawn above have certain implications for Greek SMEs that wish to adopt an open model of innovation. First, the barriers that companies are likely to face in this process have been made clear and emphasis must be given to the specific practices that reveal these obstacles. It is essential for managers to be able to recognize that fear of sharing know-how or reluctance to commit to technologies from outside are harmful behaviors that require action. It is also crucial to understand that rigid organizational structures and strict hierarchies limit the potential of innovation.

Even more important, is knowledge regarding practices that facilitate the effective adoption of Open Innovation. Obviously, the process of creating a more social company that operates under the principles of an open model of innovation is not a secondary activity. It is necessary that Open Innovation is rendered core in the company's strategy.

Key to the effective adoption of Open Innovation is a committed management that understands how innovation works. Top management is responsible for changing the culture and structure in order to prepare the company for the open model of innovation, as well as of implementing the aforementioned strategy.

More specifically, regarding organizational structure, it is crucial that the company possesses a flexible organizational chart and a non-rigid structure. The goal is sharing of information across the company and direct communication among employees. Infrastructures for exploitation and sharing of innovative ideas are of great importance, if not necessary, especially for medium-sized firms. Autonomy for researchers is also important in medium-sized companies. Finally, commitment of researchers to Open Innovation is crucial even if the available resources forbid the formation of an Open Innovation department.

As it was highlighted earlier, culture is the biggest barrier in the process of sharing technology and knowledge. Employees should be incentivized to share their ideas, to look outside the company, and their focus should be centered on commercialization. Training employees in order to embrace monetization and an entrepreneurial behavior is also necessary in many cases.

Related with culture is also the reluctance of SMEs to outsource secondary activities. This usually results in companies utilizing all their available resources and losing their competitive edge. In some cases, this is the effect of an insufficient strategy that fails to establish the company's primary goals and to distinguish its core competencies.

Being able to recognize the company's core competencies is crucial in the process of sharing intellectual property. As it was presented throughout this research, effective management of intellectual property will lead to internal development of core competencies and outsourcing of secondary activities.

Sharing of knowledge and technology is frequently faced with knowledge gaps. The findings reveal certain practices that allow the avoidance of such difficulties. Training researchers in specific technologies, funding studies of current employees, funding and providing job opportunities for researchers outside the company are some of these practices. Exchange of researchers or information together with exchange of technologies is another way to overcome the knowledge gap.

The establishment of KPIs is another key practice that will allow the company to realize the differences in the innovative process and its results with an open model, and to make decisions regarding future actions.
As it was presented earlier in this research, an innovative company is a "social" company that continuously observes the outside environment and that has established vital relationships for its innovation process. The opportunities for Open Innovation will arise from these relationships and the available contacts of the enterprise. The findings reveal that the most popular sources of knowledge and technology exchange are Universities, Research Institutes, Exhibitions, Conferences, and Open Innovation Platforms. Additionally, the research shows that organizations, networks, and authorities, like the European Union, Business Associations, or local authorities are means to enhancing a company's list of contacts and opportunities for Open Innovation.
Furthermore, attention must be given to the people inside the company who will be responsible for discovering opportunities for cooperation. Both literature and findings reveal that researchers, who already have a technical background, trained in business, is the ideal combination for this purpose.
In order for partnerships to be fruitful, a company must adopt several important practices. First, every partnership must involve a win-win situation that provides benefits for both parties. Second, a company's strategy must determine what is asked from this cooperation, and these goals must be clearly communicated to the other party. As previously, culture of cooperation is necessary and should be frequently enhanced through training. Finally, among those practices revealed in the findings, it is important to highlight that in cases where the company changes its processes to facilitate the needs of a sole client, the establishment of a long duration contract should ensure that the company's business is secured for the future.
On a different note, although Greek SMEs were "forced" to become more extroverted due to the financial crisis, extroversion has shown its positive effects to the competitiveness of Greek companies. However, Greek SMEs should not approach extroversion only as a solution for income generation, but also as an opportunity to learn, and to cooperate with other companies in order to become more innovative in different aspects of their operation.
Finally, regarding the Greek business environment, changes must take place in order to ensure more effective and beneficial networking. Additionally, universities must become more innovation oriented, and must enhance their processes and their relationships with Greek enterprises for the benefit of both.

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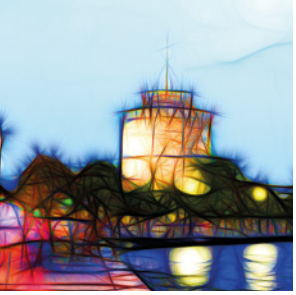

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DEVELOPMENT AND APPLICATION OF A DIGITAL TRANSFORMATION MODEL FOR IMPROVING EDUCATIONAL ORGANIZATIONS

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The use of information systems and the integration of information and communication technologies (ICTs) are required for the improvement of educational organizations. In order for this transformation to take place the development of new models are essential. In this paper a digital transformation model for improving educational organizations is developed, taking into consideration the characteristics of the direction and strategy of the educational unit, students' education, administration and development of the teaching staff, handling of administrative affairs and resource management, as well as, relationships with external stakeholders such as parents, external agencies and local communities. As part of this study, the degree to which the above activities presented in our model are converted from real to digital transformation on management procedures is analyzed. In order to check the validity of the model a pilot study was performed. A structured questionnaire was distributed to 21 principals of secondary education, 4 women and 17 men whowork in the West region of Thessaloniki. Preliminary results suggest that the model can be used to identify the extent of use of ICT and information systems in the activities of the educational organizations allowing us to make recommendations for their improvement.

Keywords
Digital Transformation Model, Educational Organizations

1. Introduction

The use of ICTs the last years brought many changes in the educational systems. As technology flows faster into the schools, many school principals upgrade and improve their technology skills, in order to face a range of difficult management issues, such as the adaptation of the new educational environment. Due to the fact that information technology and information systems improve the efficiency and effectiveness of educational management their use has increased rapidly. Management information systems support principals for planning, policy-making, and evaluation. In this paper the main principals' activities are identified, and the degree of their conversion from real to digital transformation is analyzed. Taking into consideration these activities and their relationship with external stakeholders, a digital transformation model for improving educational organizations is developed. Furthermore, a structured questionnaire was distributed to 21 principals of secondary education, in order to check the validity of the model. Preliminary results suggest that the model can be used to

identify the extent of use of ICT and information systems in the activities of educational organizations.

2. Activities

According to Keramida (2015) [1] the main principals' activities are: 1)The direction and strategy of the educational unit, 2) students' education, 3) administration and development of the teaching staff 4) handling of administrative affairs and resource management.

2.1 Direction and Strategy of the Educational Unit

School principals play an important role in improving quality of education and accountability of education's implementation in the educational unit. Strategy refers to a general plan of action for achieving one's goals and objectives. A strategy or general plan of action must be formulated for broad, long-term, school unit goals and objectives. Strategic plans are a major part of the standards used to assess a school's unit ability to meet its mission. Schools need a strategic plan to satisfy accrediting requirements and to develop strategic plans in conjunction with some other form of planning. The principal is responsible for the process of developing an information technology plan, for academic plan including the all-encompassing assessment component, and for the motivation of teachers and students [2], [3], [4], [5]. Taking into account all the above actions, the direction and strategy of the educational unit refers to the extent of principals' autonomy in policy-making. This extent depends on the educational system of each country. There are principals who have full, partial or limited autonomy in decision-making at unit level. In Greek educational system the role of principals in strategic issues is limited. The Ministry of Education is responsible for organizational strategy, state policy, exams, performance management, recruitments, selections, inductions, professional development and compensation.

2.2 Students' Education

Students' education refers to teaching, learning and research. Principals and teachers are responsible for students' success or failure. So, the principal must guide teachers in order to adapt learning methods according to students' characteristics. A principal should always be looking for ways to improve the student experience at school. An important role of principals for students' education is the development, implementation, and evaluation of school programs. The development and implementation of effective programs covering a variety of areas, such as environmental education programs, health education programs, cultural programs, ensures the students' improvement. Continuous evaluation for the improvement of the quality of the programs is performed by the principals, and essential changes are made. Another job ofthe school principal's is to handle students' discipline. An effective principal always documents disciplinary issues, makes fair decisions, and informs parents when necessary. Examination and assessment are important issues for students. The examination process is designed in order to evaluate and to assess students' performance. Assessment plays a crucial role in how students learn, their motivation to learn, and how teachers teach [2], [5], [6], [7], [8], [9]. Assessment is embedded in the learning process. It is strongly interconnected with curriculum and tutoring. As teachers and students work towards the achievement of curriculum outcomes,

assessment plays a constant role in informing instruction, guiding the students', and checking progress and success. Teachers use many different processes and strategies for students' assessment, and adapt them to suit the assessment purpose and needs of individual students. The assessment is an important feedback of educational processes for parents, teachers and students. Instruction and assessment must be based on clear learning goals and are differentiated according to students' learning needs. Students are involved in the learning process and they understand the learning goal and the criteria for quality work, receive and use descriptive feedback, and estimate their performance. Assessment information is used to make decisions that support further learning. Parents are well informed about their child's performance. All of the above help students, families, and community to have confidence in the educational system.

2.3 Administration and Development of the Teaching Staff

Administration and supervision in practice have demonstrated interrelated managerial behaviors of goal setting exercise, design and implementation of plans or programs, and appraisal. The above behaviors are necessary for the achievement of organizational goals and for improving learning experiences for students. The staff development is defined as a process that provides opportunities to teachers to acquire new skills and attitudes [4], [5], [6]. These skills and attitudes result in increased students' achievement. The administration is described as a process whereby the principal monitors and encourages teachers to actively and positively contribute towards the accomplishment of organizational goals. Delegation of duties to teachers improves the performance of the school unit. Other important issues concerning the effective performance of the school unit include recruitment of staff in schools, motivation for team work and personal growth. The teachers' evaluation varies depending on the educational system. If the educational system is centralized, the Ministry of Education is responsible for the evaluation of teachers. However, in decentralized educational systems, like the Greek one the principals evaluate the teachers' performance according to district and state guidelines. An effective school unit must have effective teachers. Evaluations should be fair and well documented pointed out both strengths and weaknesses. Principals as good evaluators always inform teachers about the expectations and offer suggestions for improvement if those expectations are met [8], [9], [10], [11].

2.4 Handling of Administrative Affairs and Resource Management

Handling of administrative affairs and resource management is identified as the implementation of educational circulars, laws and decisions of teachers' associations [12], [13]. The principal is responsible for reports, teachers' controls, enrollment and transfer of students, books orders and inspection of school equipment [14], [15], [16]. Additionally, principals are also responsible for scheduling. Scheduling includes time tables, teachers' duty schedules, computer lab schedules, library schedules, etc. Furthermore, principals are responsible for the evaluation of policies and procedures, their improvement and their notification to students, teachers, and parents [17], [18], [19]. In Greece, the Ministry of Education is responsible for the review and the creation of new policies and procedures, thus, the role of principals is limited.

3. Relationships with External Stakeholders

In education, a stakeholder could be anyone from a local business to a private donor, taxpayer, parents, local community or government organization. Stakeholders differ in importance and have varying levels of involvement in decision making. Trusting relationships with a parent supports the school and the principal's decision. Informing parents about the curriculum, their children's progress through meetings, personal discussions, brochures and invitations to school activities, are ways that support cooperation between the principal and the parents' association [20], [21]. The same holds true for the community. There are educational systems in which building relationships with individuals and businesses in the community can help school units to receive benefits [21], [22], [23], [24]. These benefits include donations, personal time, and overall positive support for the school. It is a vital part of any principal's job to foster relationships with parents and community members. In Greece, the role of parents and local communities is limited and the role of external agencies does not exist as active members of a school unit. In any case, the good relations with parents and community members are important [1].

4. Digital Transformation Model

A digital transformation model for improving educational organizations is developed, taking into consideration the above actions. As part of this study the degree to which the above activities are converted from real to digital transformation on management procedures are analyzed (Figure 1).

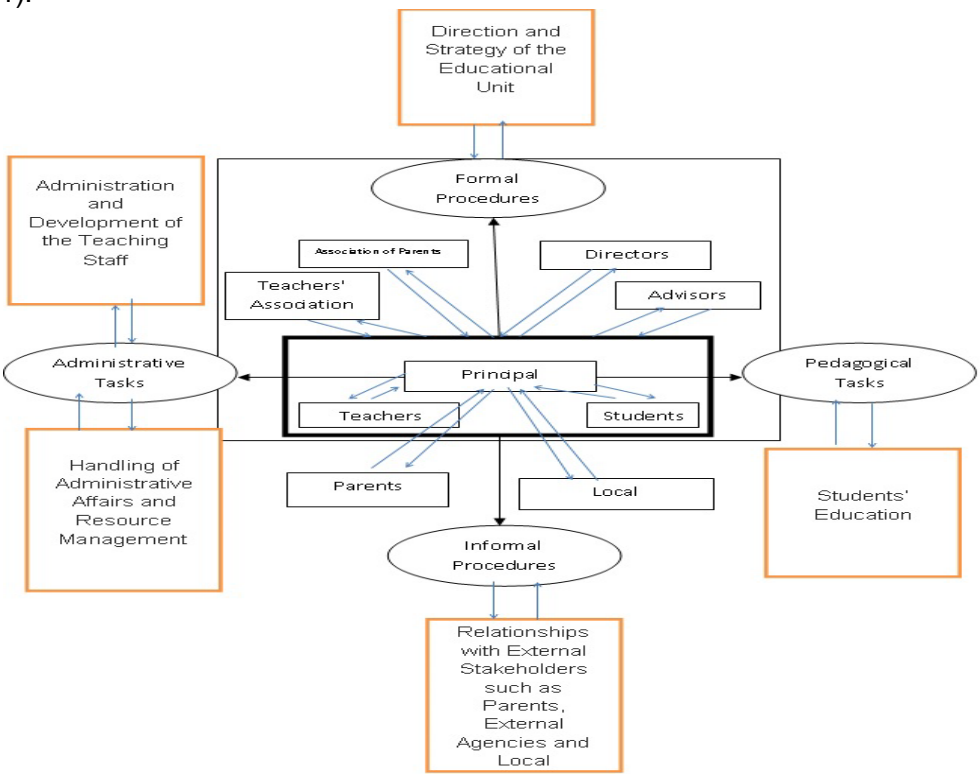

Figure 1 Digital Transformation Model

The above digital transformation model allows principals to identify areas which need improvement. The use of information systems supports the direction and strategy of the educational unit. With the help of ICTs and information systems principals can collect or retrieve, process, store, and disseminate information for student and teachers to support decision making and control. ICTs and information systems facilitate the process of developing an information technology plan, the creation of academic plan including the all-encompassing assessment component, and the motivation of teachers and students. A portal is necessary to provide the entry point for students, teachers and principals.

The use of information systems for students' functions includes actions as maintenance and reporting of student data, handling inquiries from prospective students and the admissions process, enrolling new students and enabling online scheduling, handling records of examinations, assessments, marks, grades and academic progression, maintaining discipline records and records of absences and attendance, communicating student details to parents or other persons authorized by the student Statistical reports should be available from the system.

The use of information systems for teachers' functions includes actions for automatic creation of class and teacher schedules, course assignments, records regarding leave of absencesor participation in,as well as, qualifications.Reports derived from these actions will help to organize the recruitment of staff in schools, to motivate team work and, to empower staff.

The implementation of educational circulars, laws and decisions of teacher associations [12], [13] is supported by using information systems and ICTs. The principal is more effective in handling administrative affairs and resource management through the availability of written reports and schedules [14], [15], [16]. The integration of information systems in the administration of educational units reduces workload, improves the operations and the quality of services. The effective principals establish educational policy, organize and prepare innovative actions using information systems.

The use of information systems improves the relationships between school, parents, teachers and local community. Principals use information systems to handle issues such as evaluation of educational projects, regulatory reporting and reports for accrediting bodies, although some are reluctant to use them [22], [23]. Through the use of information systems learning needs and the improvement of the education's process are identified. Educational processes can be upgraded at the strategic level. Furthermore, the process of all teachers and students evaluation is enhanced, as well as, the transparency of the public educational administration[24], [25], [26].

In order to check the validity of the model a pilot study was performed. A structured questionnaire was distributed to 21 principals of secondary education, 4 women and 17 men who work in the West region of Thessaloniki. The completion of the questionnaire was easy according to the participants. Preliminary results suggest that the model can be used to identify the extent of use of ICT and information systems in the activities of the educational organizations, allowing us to make recommendations for their improvement.

5. Conclusions

Information systems support principals with the information required for informed planning, policy-making and evaluation. In addition, school management areas as leadership, decision making, workload, human resource management, communication and planning have been changed, using information systems. These systems help principals in determining the aims of the school, formulating strategic plans, distributing resources and evaluating staff performance,

as well as, organizational success [26], [27], [28]. In order to achieve the benefits, there are several inhibitors that must be considered. These include, lack of confidence or skills, lack of training and seminars, lack of senior management support, lack of updates and lack of technical support. Thus, principals and educational authorities must find ways for implementing and sustaining technological innovation [27]. According to Laudon & Laudon (2011) [28] an information system represents a combination of management, organization and technology elements. The principal must understand the organization, management and technology dimension of systems and must recognize their power to provide solutions to challenges and problems in business environment. Organizations with powerful computers, networks, and software are more flexible to response to changes of the businesses' strategy rules and procedures. The management dimension of information systems involves leadership, strategy and management behavior. Principals allocate, coordinate and monitor the educational unit and their work and make decisions, using the tools of information systems. Appropriate training programs, seminars and effective leadership must rise in the area of school management and help to make teamwork and collaborative work environments. Each organization must carefully design and manage its information system, using hardware, software, data management technology and networking. This set of technology services are needed in order to accomplish successfully the tasks. Technical support and updating of software are issues which support the effective use of information systems [19], [24], [25], [28].
The Digital Transformation Model developed in this paper will assist the principals to consider all issues regarding the use of ICTs in the educational organization. Preliminary results of our pilot study showed that the model can be used to identify the extent of use of ICT and information systems in the activities of the educational organizations, allowing us to make recommendations for their improvement. After the validation of the model the structured questionnaire of the pilot study was distributed to 200 principals and results are expected the next few months.

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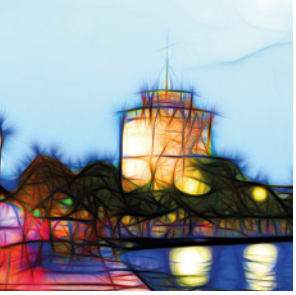

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DESIGNING USER-CENTRED AND CONTEXT APPROPRIATE STRATEGIES FOR UNIVERSITY-INDUSTRY INTERACTION: INNOVATION LABS IN CENTRAL ASIA

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Successful cooperation by higher educational institutions (HEIs) in mutually beneficial synergistic relationships with governments and business is a core driver of growth and innovation in knowledge-based economies. Whereas, in most European Union (EU) countries, university-business interactions have been widely fostered in an array of diverse cooperation patterns, structures and schemes, Central Asian (CA) countries are only just beginning to create strategies and structures that have a clear focus to promote sustainable economic innovation. However, there are many obstacles on the path towards embedding an innovation structure and culture in CA economies. The project on which this research is based introduced, developed and implemented "Innolabs" as sustainable, user-centred initiatives, built on experience from the EU and elsewhere, to foster knowledge exchange and innovation. The aim was to help CA HEIs link academic research and knowledge production with an entrepreneurial spirit, through adopting a greater interdisciplinary focus on social and organizational practices and the needs of innovation end-users. In turn, this would foster more targeted organizational development and a growing innovation culture in staff, students and the local business environment. This paper assesses the process of design and implementation of Innolabs as context-appropriate and user-centred instances.

Keywords
Central Asia, Knowledge Triangle, University-Business Cooperation

1. Introduction

Fostering, developing and exploiting successful cooperation between higher educational institutes (HEIs) in synergetic relationships with governments and business has long been identified as a major driver of innovation in knowledge-based economies and societies [1], [2], [3]. As Etzkowitz and Leydesdorff [4] stress, such relations are in a process of "endless transition". CA countries are just beginning to create strategies and structures for mutually beneficial university-business cooperation (UBC) to promote economic development. This paper discusses UBC within the previously under-researched context of CA, a region which is of growing interest to all. In addition, the setting for the work was not the familiar one of developed countries, but that of transitional economies with their own very different challenges and opportunities. It is important to understand the experience of developing countries in developing

successful UBC not just as a topic in its own right, but also as a counterpoint to developed countries' perspectives.

The project on which this research is based introduced, developed and implemented "Innolabs" (a concatenation of Innovation and Laboratories) as sustainable, user-centred entities, built on experience from the EU and elsewhere, to foster knowledge exchange and innovation. The aim was to help CA HEIs link academic research and knowledge production with an entrepreneurial spirit, through adopting a greater interdisciplinary focus on developing cooperative social and organizational practices and to promote the needs of innovation end-users. In turn, this would foster more targeted organizational development and a growing innovation culture in staff, students and the local business environment.

This paper describes the process of developing Innolabs in 14 HEIs from the five CA countries (Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan). The prime research question was:

How do we design and implement Innolabs to support university-business cooperation in a CA context?

The Innolabs were designed, developed and launched within a European Commission funded project (INOCAST "Innovation Labs in Central Asia for a sustainable catalyzation of innovation in the Knowledge Triangle") which ran from March 2014 to November 2016**.** The target groups were primarily top and middle management, regional government officials, university leaders and the academic and research communities of the participating HEIs. The project was grounded in action research and positive interventions in developing practice. It embraced three phases: the definition of a design process for the Innolabs, discussed in more detail by Göbel and Leal [5]; development and agreement of implementation plans and, finally, as far as the project per se was concerned, their initial execution. At the design stage, this included the identification of external conditioners, internal capabilities and needs at host HEI and Innolab levels, stakeholder mapping, the definition of target areas and strategies to serve them, as well as service portfolio formulation. This design process validated an implementation and scale-up plan for each Innolab. The implementation level defined the necessary structures to support Innolabs and grounded them in a higher level of connectivity at internal HEI level, within local communities of interest and as part of an extended CA level network. The research embraced secondary information search (a review of relevant indicators at national-regional-HEI levels), quantitative research (surveys conducted by all CA HEI actors) and qualitative research (documenting, sharing and evaluating processes and experiences across the project network).

2. The Central Asia Context

It is tempting to treat CA as being a single, relatively homogeneous region; the commonly used shorthand reference to them as the "stans" reinforces this conception. This reflects their remoteness in geographical (being predominantly landlocked) and cultural terms, a relatively short history of independence from the USSR, the major influences that Russia and China have over the region in political, language, cultural and economic terms and their lack of presence in the educational, research and publishing activity in the EU and elsewhere. They are also still transition economies subject to a great deal of central planning and control without any significant experience of market economy operation. The political system has not fully developed, and party politics still immature. Authoritarianism prevails, and conflicts among elites are prominent. Long term social issues, such as poverty, population and land usage, have

been joined by new ones, notably food security problems and intrusion of religious extremism into education. Figure 1 shows a map of CA.

Figure 1 Central Asia

Economic cooperation between China and Central Asia has been deepening and has become a powerful engine for the region's economic development. At the third China-Central Asia Co-operation Forum in June 2015, a commitment to "jointly building the Silk Road Economic Belt" was incorporated into a joint declaration signed by China and the five CA countries. The European Commission and the Chinese government signed a Memorandum of Understanding on the EU-China Connectivity Platform to enhance synergies between China's "One Belt One Road" initiative and the EU's connectivity initiatives such as the Trans-European Transport Network policy. Russia has also been playing a key role in the region's development and stability. For example, a customs union between Russia, Kazakhstan and Belarus has been introduced to promote regional economic integration.

However, there are marked differences between the five countries. In population terms they range from 5.2 million in Turkmenistan to 30 million in Uzbekistan. Kazakhstan and Turkmenistan are highly dependent on oil and gas exports. Kyrgyzstan and Tajikistan have rich resources of gold, aluminium and other metals. However, even though services' share of GDP has increased remarkably in most countries in the region, except for Kazakhstan, the average share of services in GDP in north and central asia (50 per cent) is well below the world average (70 per cent) and natural resources continue to make up the bulk of exports. Conflicts among CA countries themselves are also apparent. For instance, the long-running dispute over water resources between Uzbekistan and Tajikistan is a significant source of regional tension. EU development assistance focuses on good governance, higher education, vocational education and training, promotion of economic development, sustainable energy, environmental sustainability and water, as well as on combating common threats and challenges.

3. The INOCAST Project

The INOCAST project aimed to address the need of CA universities to develop a sustainable, built-on experience and user-centred infrastructure for catalyzing innovation. The main output of the project was the creation of fourteen fully operational Innolabs able to stimulate the commercialization of university and other research, responding to user needs, building in

previous experience and incorporating best practices into the design of products, processes and services. The Innolabs were to be viable in the long term and their structure and functioning principles usable and customizable in other institutions, thus facilitating the development of a culture of innovation and entrepreneurship. INOCAST embraced the diversity of CA regions and their conditioners, involving 14 Higher Education Institutions (HEIs) from ten different regions in the five countries.. The partners varied in size from having 1,200 to 30,000 students, included both public and private institutions, and specialist and generalist providers. The objectives of INOCAST were:

- The creation of an innovation network comprising stakeholders as a supra-regional platform for the exchange of experiences and development of a sustainable scheme for enhancing innovation and public-private partnerships in CA
- The definition, infrastructural establishment and operation of fourteen Innolabs, establishing spaces for experimentation, product and service development in agreed focus areas, and community engagement by fostering entrepreneurship and an innovation culture
- The strengthening of the relevant managerial, strategic and technical capacities of staff from the CA partner universities

By assembling the project structure around the design, implementation and operation of Innolabs, INOCAST hoped to promote fundamental innovative change at institutional level, and, on a broader scale, across the higher education sector in the CA. The Innolabs' guiding principles were to be: user centered and equity focused; built on previous experience; sustainable in the long term; open, inclusive, and multi-stakeholder; pluri-disciplinary; and scalable, replicable and customizable.

Figure 2 summarises the delivery structure of INOCAST. The major activities are briefly described in following sections. However, before INOCAST delivery and findings are set out it is useful to locate INOCAST philosophy within the mainstream of debate concerning the role of universities in the innovation landscape.

4. Models of Successful UBC

UBC is a relatively new professional field and one which is of fundamental importance to the development of Innolabs. UBC goes beyond the traditional approaches of technology transfer and spin-out development to encompass partnership development, science–business marketing, knowledge translation and integration and business support services including incubation, entrepreneurship and mentoring. While such approaches are vital for university-business interaction there is additionally the requirement to support an institution-wide strategic view of UBC in line with the principles of enterprising and "entrepreneurial universities".

INOCAST used two main conceptual devices to guide discussions and debate; the Knowledge Triangle and the Triple Helix model. These stress the shift from a dominant industry-government dyad in an Industrial Society, such as those found in CA, to a growing triadic relationship between university-industry-government typical of the Knowledge Societies in the developed economies of Europe. An Innolab is intended to be space where opportunities for innovation and development can be created and fostered in and enables a prominent role for the academy in collaboration with industry and government to generate new institutional and social formats for the production, transfer and application of knowledge.

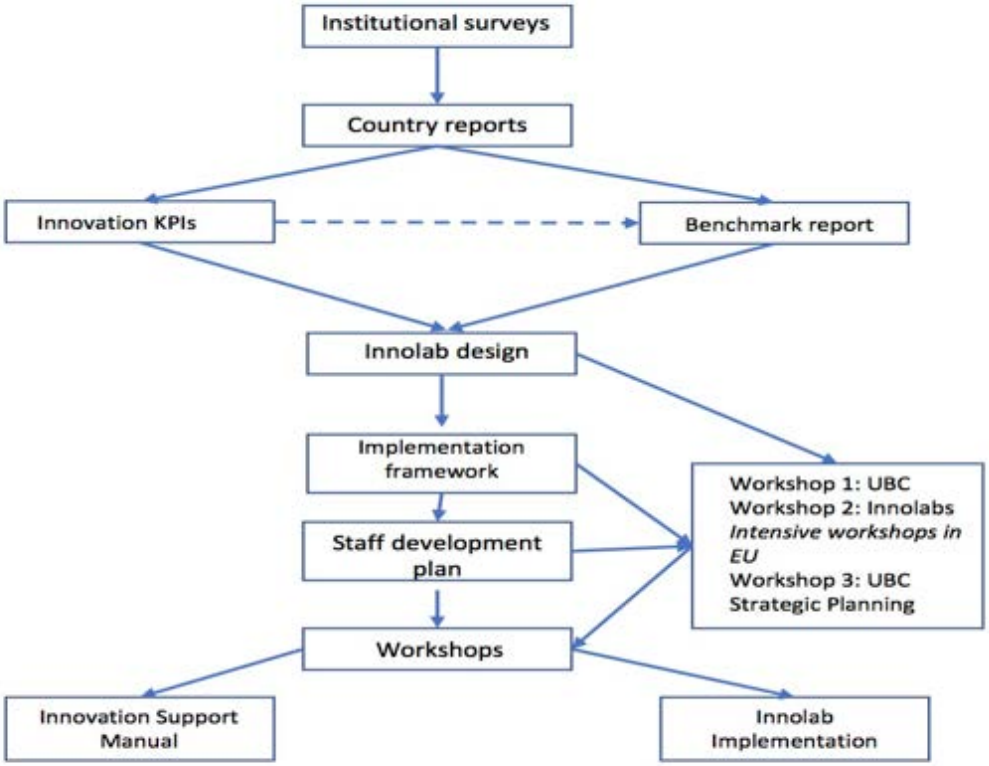

Figure 2 INOCAST Project Activities

Both models were used throughout the delivery of INOCAST as a means of structuring the debate as to how Innolabs might work and to provide a continuous narrative through those discussions. Neither model was used prescriptively but did provide a "common currency" and shared conceptual language for project development. As such, they were touchstones rather than rigid templates for Innolab creation. The INOCAST project was not intended to be a vehicle for testing or developing either model, however experience from the project showed that both conceptualizations were very useful frameworks to shape and support project debate. The strengths of the models in helping structure and develop debate was invaluable given the diversity of backgrounds of members of the project team; Triple Helix concepts may well be very familiar to colleagues from EU business schools but entirely new to an engineering professor from, say, Turkmenistan.

5. Developing an Innolab

Developing an Innolab, at least for the duration of the INOCAST project, fell into four stages:

1. Observation – the process of horizon scanning for ideas, observing best practices and examples, case studies and gaining inspiration.

2. Testing – the act of implementation of an Innolab activity at pilot level, testing for functionality and compliance, assessing market potential.
3. Up-scaling – the process of extending newly established innovation activity to a higher level, upgrading volume and expanding the current offer.
4. Diffusion – the practice of implementation of newly established Innolabs by further users and in other contexts.

5.1 Observation

The top four boxes of Figure 2 summarise the project activities targeted on identifying the starting positions on which INOCAST was to build. These activities were vitally important as a route to all partners understanding each other's institutional, economic, social and historical contexts. The institutional surveys collected a wide range of initial data which was collated by the EU partners and summarised in a detailed report for discussion. The second block of questions concerned the research and innovation support environment. Each partner provided information on the innovation support structure and approach at the institutional, local and regional levels, available innovation tools and sources of funding. The institutional level survey data was amalgamated on a country-by-country basis to provide an overview of innovation activity and policy, the Country Reports. The fourteen initial audits were summarized in a Benchmarking Report.

The audit revealed that UBC initiatives in CA were in their infancy. As was expected, the picture was patchy and the progress made markedly variable across countries. For example, there were more than 40 business incubators, broadly defined, in Kazakhstan. The main incubator clients were companies engaged in production activity with only 2% focusing on technology development. Kazakhstan also boasted ten technoparks, three of these were located on university premises, the remaining seven with enterprises and research centres. Technoparks provided space and access to equipment, and communication services. They also benefitted from some financial and tax privileges, notably exemption from land and property taxes and VAT. At the other end of the spectrum the first technoparks in Tajikistan and Turkmenistan were opened in June 2014. The first business incubator in Tajikistan was opened in January 2014, implemented by the National Association of Business Women of Tajikistan and financed by the European Commission. The aim of this business incubator was provision of free consulting services for organizing and conducting business activities.

Partners were asked to identify the blocks to accelerating innovation and changing mindsets. The following list is a by no means exhaustive summary:

- incompleteness of research and its separation from production
- high costs of innovations and low financial support from government
- riskiness of innovation activity
- technical and technological weakness of enterprises
- lack of a productive relationship between "science" and industries
- shortage of qualified researchers
- low level of investment into research
- lack of demand for technological innovations
- lack of commitment from senior management in industry and universities
- misunderstanding and under-estimation of IPR (intellectual property rights)
- gaps in the innovation process between invention and commercialization

- inability to focus all the resources
- mismatch of research laboratories' facilities with international standards
- loss of skilled researchers
- lack of interest and motivation among young people
- inability of financial institutions and markets to provide long-term funding for research

5.2 Testing

The testing stage of Innolab development was structured around the development of feasibility plans for each of the fourteen instances. Plan development involved workshops, development of a plan template, completion of the template, sharing of draft templates between partners and detailed feedback from the EU to the CA partners. The feedback given was not meant to be an examination-type assessment with the intention of ranking CA partners in some way or where some would "pass "and others "fail". It was an opportunity to take stock, individually and as a network of partners, identify any gaps and clarify areas where needed.

It is also important to fully understand that each Innolab was different; there was no set of suggestions for the "ideal" Innolab. Each Innolab sits within an institutional context and a regional economic environment of its own. The most important element of planning was to ensure a good fit between an InnoLab and its environment. Most CA partners simply provided lists of activities which might be undertaken. However, such lists did not always relate to the competencies of their universities, the challenges affecting the regional economy or evidence of what potential client enterprises might want. Whilst many of the activities identified were logical and desirable in themselves, no justifications for the idea that a proposed Innolab would be a favoured or needed supplier was forthcoming.

Many plans simply listed potential end-users (mainly consultancy clients) and/or products which might be offered. This information seemed to be supply-side generated, rather than being the product of any needs analysis, market research or prior experience of working with regional businesses. Some feasibility studies went beyond this, although no partners seemed to have done any market research of significance. We also asked CA partners to identify "enthusiasts" for their plans. The word "enthusiasts" is interesting and deliberate. The question is more testing and difficult than simply identifying potential clients. Enthusiasts are those who can be relied on to be very positive and active in their support.

The notion of "value" was also narrowly interpreted. Some plans recognised that the Innolab could provide value for students, inform and enrich the curriculum, enhance institutional reputation, generate employment opportunities for graduates and so on. In a limited number of cases it was proposed that services would be provided without charge, but with the clear recognition that the Innolab could generate value in other ways. For example, the Innolab could give enterprises access to potential employees, reduce the risks of product experimentation, expose staff to new ideas, give access to new networks, provide access to specialist resources when needed; the possibilities extend far beyond the immediately obvious cost-saving or revenue-generating ones.

It was also surprising that very few of the feasibility plans made reference to regional economic development plans. It would be very surprising if external environment elements did not influence regional economic development strategy in some way or other. Some feasibility plans identified these issues but then went on to discuss possible Innolab activities as though they did not exist. It is quite clear from the audits that specific regional problems do exist. These include

over-dependency on a particular sector, (for example oil and gas, or agriculture or metal industries), or an issue such as lack of skilled labour, a low rate of new company formation, knowledge gaps in the local economy and so on. Innolabs have the potential to generate value for regional policy makers, the regional economy (by helping it become more competitive and generating employment) and for society in general, but this aim was not visible in feasibility plans.

The detailed and extensive discussions of the Innolab feasibility plans resulted in agreement on a range of design principles. An Innolab:

- Is driven by open innovation
- Shares risks and rewards
- Supports an interdisciplinary approach
- Supports multi-stakeholder design of knowledge
- Fulfils the dual mission of design science
- Contributes knowledge to society
- Contributes knowledge to the research community
- Provides a favourable environment for risk-taking
- Supports programs and teachers at the university by disseminating knowledge and experiences for students
- Has access to the latest research in specific areas
- Supports the application processes for research projects
- Builds artefacts in terms of demonstrators and prototypes
- Enables students to get in contact with industry leading entities for job opportunities
- Actively involves users at all stages of development (co-creation)
- Involves multiple partners from private and public sectors
- Brings together different disciplines and approaches from design, science, technology and business
- Provides a dedicated space (real and/or virtual) for experimentation and development of new ideas

The challenge for an emerging Innolab is to find a strategic fit with its business environment, both in terms of its internal capabilities (what it can supply) and what the market (the external environment) requires. One way, perhaps the most dominant, of looking at business strategy is to try and understand the ways in which a business entity dynamically balances its internal environment of resources, capabilities, history, culture and mandates with the changing external business environment. The “dynamic” aspect is important since it recognizes that this is not a once and for all exercise, but rather a continuous process of adaptation and learning.

6. Innolab implementation

All fourteen CA HEIs completed the Innolab design process, and launched them within the framework covered by INOCAST. The action research results provide further understanding of the synergies existing in the innovation environments and spaces where the CA partner HEIs live and interact; these are critical in determining the absorptive capacity available to exploit the knowledge generated and to maximize UBC. The process leading towards Innolab inception revealed the incidence of key factors underpinning their effective deployment. Such factors were linked to both framework and situational spheres, such as the existence of previous agreements

and practice, the profile and motivation of the actors involved, the diverse internal characteristics of partner HEIs and the levels of resource allocation. The development of "entrepreneurial universities" where the HEI works closely with industry to introduce innovation to the market, and, in the process, generates value, in the broad sense, for all stakeholders, is easy to promote but difficult to achieve. INOCAST has served to underline the problems:

- A low level of experience and practice in the field of business support in general and a lack of an entrepreneurial and innovation culture in universities
- Weak links between universities and the business environment with universities not being prepared to meet the business needs and customize the results of their research and development
- The existence of "white spots" in the various national laws relating to state support measures to create favorable conditions for transition to innovative development
- Few "success stories" that would encourage students, researchers and employees to contribute to economic and social development through the creation of new innovative companies and enterprises.

7. Conclusions

An Innolab is much more an approach to innovation than a blueprint for innovation agencies. An Innolab is a flexible and contextualized way to put a team together with the intention to solve a problem. In this respect, an Innolab is thematic-centered, pluri-disciplinary, open and multi-stakeholder. An important aspect of the Innolab approach is the capacity for self-renewal and a continuous search for the most appropriate resources (human and financial) and methods to deal with targeted issues. The creation of an Innolab network connected to existing and emerging structures of innovation organisations, like the European networks of "Living Labs" and clusters, can play an important role in enhancing their long-run effectiveness. The networks of Innolabs could help create an ecosystem of innovation in CA, promoting the balance between technological, sustainable and human-centric approaches to future challenges.
Understanding that innovation is for all – not only innovating for people but innovating with people – challenges the view of innovation as a closed process dominated by a rarefied technological and scientific establishment. Instead, innovation is seen today as a movement to improve the quality of life and face the global challenges of the future. We need openness and transparency, speed and synchronization, new types of partnerships and global networks to solve complex global problems. Lastly, it is important to highlight the issue of scaling and diffusion of Innolabs. A major risk with such initiatives is that they remain in the realm of "scientific experiment", disconnected from the rest of society. The path from Innolab to broader practice requires that their benefits should be continuously demonstrated, promoted and rewarded.

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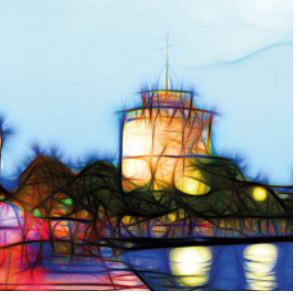
Abbreviations

CA Central Asia
HEI Higher Education Institution
UBC University Business Cooperation



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BUILDING A BRIDGE BETWEEN THE MOTIVES OF STUDENTS' ENROLLEMENT AND THEIR LEARNING EXPERIENCE IN DISTANCE LEARNING POSTGRADUATE PROGRAMMES IN ENTREPRENEURSHIP

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This novel research explores what motivates a student to participate in the distance learning postgraduate programme in entrepreneurship in conjunction with their learning experience during their studies. To this extent, we examine as a case study the distance learning postgraduate programme "Entrepreneurship and Governance" which is offered by the University of Peloponnese. This Master's programme targets graduates who plan to become future entrepreneurs to identify, assess and manage business enterprises. It allows students to critically understand contemporary issues in entrepreneurship and create enterprises which can be competitive and innovative. This distance learning programme is a 3-semester master's programme and the total number of modules which are offered in the first two semesters is 10, while the third semester is dedicated to the master's thesis. The research is based on a questionnaire, which is completed by 87 students, coming from a wide range of educational background.

Keywords
Distance Learning, Education, Entrepreneurship, Motivation, Student

1. Introduction

Entrepreneurship is the engine room of most successful economies in the world. It plays a major role in economic growth and prosperity through its vital role in job creation, savings and investment promotion, skill development and innovation stimulation. University education has been noted as a key determinant in fostering entrepreneurship among young people [1]. According to Odunaike and Amoda [2] entrepreneurship is the art of setting up and running an enterprise in a profitable and sustainable manner. The entrepreneurs are those people who are innovative, discover opportunities for existing and new products and have the quest to satisfy the needs of the customers in market. To satisfy these needs, the entrepreneurs have to start up new ventures in line with the identified needs of the market [3]. Distance

learning has been defined as “a wide set of applications and processes, such as web based learning, computer-based learning, virtual classrooms, and digital collaboration that facilitate teaching and learning among persons not physically present in the same location. It includes the delivery of content via Internet, intranet/extranet, audio and video, satellite broadcast, interactive TV, and CD-ROM” [4], [5].
The present study examines the factors that motivate people to follow distance learning postgraduate programmes and become successful entrepreneurs. This study commences by providing the personal characteristics of the participants. In the second part, we provide information about methodological approach of the research and questionnaire design. In the next part, we present research questions and the results of research carried out. Finally, we discuss the findings of this research and come to conclusions.

2. Methods

2.1. Research Methodology

This research aims to shed some light in the incentives to choose to study this programme by means of distance learning education at the University of Peloponnese and identify problems and ways to overcome them. The identification of students’ expectations regarding the curriculum and extra-curriculum activities is crucial in order for advanced learning experience to be offered. The research is based on a questionnaire, which was completed by 87 students, coming from a wide range of educational background.
This quantitative research technique was applied to address the following four research questions in the present paper:

1. Which are student’s motives to participate in the distance learning postgraduate programme “Entrepreneurship and Governance” (consisting of 11 items)?
2. What are the obstacles in applying to participate in this Master’s Programme (consisting of 4 items)?
3. How do students evaluate the distance learning education technique (consisting of 22 items)?
4. How does this particular postgraduate programme shape the entrepreneurial goals for young people to materialize their innovative ideas (consisting of 6 items)?

A total of 90 questionnaires were distributed to the students participating in this programme. Data collection took place over the course of approximately two months through questionnaires. Questionnaires were distributed throughout the classrooms on paper and in person to the participants, to increase the rate of response and reduce response time. The number of properly completed and returned questionnaires was 87 giving response rate 97%, a rate that shows high representative results of this explanatory research.
The results from the questionnaires were analyzed in SPSS Ver.24, and were recoded and total scores were computed, after which Cronbach’s alpha checked the internal reliability of the scale used, minimal, maximal, mean and standard deviation values were computed to obtain a better sense of the results and identify major differences. Cronbach’s alpha was found remarkably high α=0.908.
The questionnaire was developed appropriate to the research topic and divided in five sections. Its structure follows the theory of Illeris (2007) for learning [6]. The *first section* includes demographics of the participants (such as gender, age) and organizational

information where participants work (such as position in service). The *second section* aims to evaluate knowledge, skills and attitudes which were gained from attending this programme and that are essential in the world of entrepreneurship. *Section three* evaluates student's motivation for participating in this programme. *Section four* analyses the difficulties which appeared while deciding to attend this programme. Finally, *section five* evaluates curriculum and extra curriculum activities. The last two sections correspond to the framework dimension in the Illerian theory for learning.
This research uses a quantitative approach. It contains closed questions with answers such as YES or NO, open questions and evaluation questions. All items (a total of 48) are measured using five point Likert scale, form 1-strongly disagree, 2-disagree, 3 – neither agree nor disagree, 4 – agree, 5- strongly agree. Table 1 presents factors measured in this questionnaire.

Table 1 Research factors

Factors	Items
1. Programme structure	10
2. Student's motivation for participation	11
3. Difficulties which appeared while deciding to attend this programme	4
4. Curriculum and extra-curriculum activities	9
5. Curriculum and importance of attending a post-graduate programme by means of distance learning education	7
6. Entrepreneurship interests	7

3. Results

The findings of this research can act as a navigator in designing better distance learning postgraduate programmes in entrepreneurship.
A majority of the participants 63.2% was female. Forty percent of the participants were 26-35 years old and the majority of the participants (56.3%) have job experience.
Table 2 presents the main characteristics of the participants.

Table 2 Demographics of the sample – descriptive statistics

Marital status	Unmarried Married Divorced Cohabitated	41.4% 51.7% 2.3% 4.6%
Educational background	Undergraduate Postgraduate PhD	75.9% 23% 1.1%
Work experience	YES NO	56.3% 43.7%
Work Industry	Public service Private service Self employed Other	35.6% 18.4% 1.1% 1.1%
Position in service	Director Employee	18.4% 36.8%
Years of Work experience	1 – 5 years 6 – 10 years 11 – 15 years 16 – 20 years More than 20 years	17.2% 11.5% 13.8% 3.4% 10.3%

One of the central research questions is to determine a student's motives. In order to determine what are the motives that lead students to apply for this Postgraduate Programme, a survey was conducted with the question what motives led them to apply to this programme. As can be seen in Table 3, in responding to the question that inquired about the motives to follow this Programme, the majority of participants responded they selected it in order to gain a diploma in Entrepreneurship (80.5%). Approximately the same number of participants indicated that they wanted to satisfy their personal interests (81.6%), so they focused on entrepreneurial development in order to learn the fundamentals of entrepreneurship (89.7%).
The results shown in Table 3 demonstrate that a strong majority of participants followed this programme in order to increase their odds of successfully launching and maintaining a new business venture (66.7%) which is important at their work (51.7%). Furthermore, the acquaintance with new scientists was not a motive to select this Programme (59.7%).
As for the motive of no need to participate in exams in order to be admitted to the University appears important for 51.7% of the participants. Friend's opinion who participated in the programme influenced 37,9% of the participants in their choice.
The tuition fees constituted an obstacle in the choice of this programme for 25.2% of the respondents. Furthermore, timetable of courses does not influence the majority of the participants as lessons are held via a distance learning method (47%). So this programme holds many advantages for the participants with limited time and seed money to invest.

Table 3 Questionnaire responses, Descriptive statistics:
Student's motivations for attending this programme

Questions	Responses (%)					
	No opinion	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
Gain a diploma in Entrepreneurship	1.1		3.4	10.3	29.9	50.6
Personal interest		1.1	1.1	11.5	33.3	48.3
increase their odds of successfully launching and maintaining a new business venture		3.4	8	17.2	32.2	34.5
Meet new scientists	1.1	25.3	14.9	19.5	20.7	13.8
To learn the fundamentals of entrepreneurship				5.7	25.3	64.4
Necessary for my work	1.1	8	11.5	23	28.7	23
No need for participating in exams in order to be admitted by the University	4.6	9.2	18.4	24.1	19.5	19.5
Friend's opinion who participated in the programme	5.7	23	13.8	14.9	23	14.9
Tuition fees	1.1	16.1	19.5	33.3	17.2	8.0
Timetable of courses	1.1	8	12.6	26.4	31	16.1

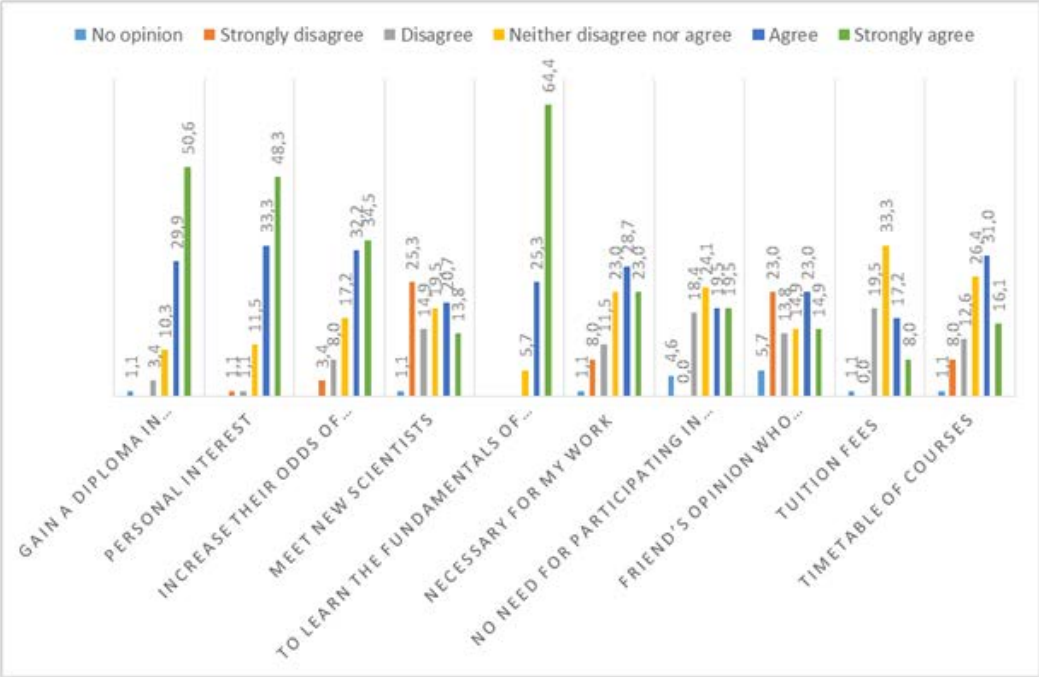

Figure 1 Graphic presentation of student's motivations for attending this Programme

Our second research question deals with identifying difficulties that occurred while applying for participation in the Postgraduate programme. As can be seen in Table 4, personal reasons and difficulties commuting to the University do not constitute difficulties in the

application procedure for participating in this programme (more than 65%). Taking into consideration their desire to gain a master's degree, personal satisfaction and personal development confirms these results.
Due to family reasons, some of the respondents (49,4%) reply that they could not participate in the programme while 51,7% of the participants are married. Finally, 40.2% of the 56.3% participants who are currently working, gave professional reasons as a problem in following the curriculum of this Programme.

Table 4 Questionnaire responses, Descriptive statistics:
Difficulties in applying for participating in this programme

Questions	Responses (%)					
	No opinion	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
Personal reasons	10.3	20.7	13.8	19.5	12.6	18.4
Family reasons	9.2	18.4	16.1	16.1	16.1	19.5
Difficulties commuting to the University	3.4	24.1	14.9	25.3	12.6	14.9
Professional reasons	3.4	11.5	13.8	26.4	24.1	16.1

Our third research question deals on how do students evaluate the distance learning education technique. As can be seen in Table 5, the findings of this research indicated that the majority of the students evaluate the lectures (52.8%), academic discussions (57.5%), feedback received from professor (57.5%), written assignments (74,7%), final exams (71.2%) and teaching method (63.2%) positively.

Table 5 Questionnaire responses, Descriptive statistics: Evaluating programme structure

Questions	Responses (%)					
	No opinion	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
Lectures	4.6	5.7	5.7	31	31	21.8
Academic activities	8	9.2	18.4	25.3	24.1	14.9
Academic discussions	2.3	3.4	12.6	24.1	36.8	20.7
Feedback received from professor	2.3	4.6	17.2	18.4	34.5	23
Written assignments	1.1	2.3	6.9	14.9	37.9	36.8
Final exams	1.1	2.3	9.2	16.1	40.2	31
Teaching method	1.1	4.6	10.3	20.7	35.6	27.6
Knowledge acquired	1.1	2.3	9.2	25.3	34.5	27.6
Entrepreneurial skills cultivated	4.6	3.4	12.6	32.2	26.4	19.5
Understanding of concepts	6.9	6.9	17.2	25.3	23	19.5

As can be seen in Table 6, building student – professor and student – student relationships is identified as an important factor for the University, and is positively evaluated by the participants (more than 55.2%). These results show when students feel comfortable with the University community, they excel academically, creating a win win situation for everyone.

A good relationship with professors helps students feel like they belong in the University community. Professors can aid in building this relationship by helping students understand that they should get to know their professors; thus, resulting in a better educational experience. Faculty members who understand the educational needs and interests of their students can appropriately tailor assignments, expectations, and conversations. Professors who work with distance-learners can help their students build relationships with faculty, even if those relationships must take place through a distance learning experience. Regardless of the environment in which learning takes place, students feel more satisfied when faculty members function as an active part of their lives.

Team work is a skill that employers require and expect graduates to have and be able to apply this in the workplace. Educational institutions on the other hand are expected to provide opportunities for the development of these professional skills, and to prepare students for working effectively in the workplace. Team skills include the ability to communicate effectively with team members, to work collaboratively to solve problems, and to negotiate with peers and resolve conflicts.

In the survey, students were asked if the Postgraduate Programme emphasized team work conducted and positively evaluated the online environment of this Postgraduate Programme (44.8%). They learn how to be competitive and innovative, and team work covers topics such as mistakes and failures, strategies, creativity and technology.

The official e-class platform, i.e. BigBlueButton, is an open source web conferencing system for on-line learning which was positively evaluated form by the participants (58.6%). BigBlueButton supports multiple audio and video sharing, presentations with extended whiteboard capabilities - such as a pointer, zooming and drawing - public and private chat, desktop sharing, integrated VoIP, and support for presentation of PDF documents and Microsoft Office documents. The goal of this platform is to provide students with a high-quality on-line learning experience.

Finally, the majority of the students had a negative opinion as far as using printed educational material in concern (58,6%). It is obvious that they prefer to use educational material which can be found while searching the Internet.

Table 6 Questionnaire responses, Descriptive statistics:
Evaluating curriculum and extra curriculum activities

Questions	Responses (%)					
	No opinion	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
Relations between students and professors		5.7	10.3	23	27.6	27.6
Collaboration in teams	3.4	11.5	16.1	18.4	20.7	24.1
Relations between students	3.4	5.7	10.3	23	26.4	25.3
E-class platform		1.1	13.8	20.7	27.6	31
Printed educational material provision		9.2	27.6	21.8	25.3	10.3

As can be seen in Table 7, the majority of the students are satisfied from participating in distance learning programmes (71.2%). Furthermore, the majority of the students believe that e-learning techniques in education has become essential in our world (86.2%).

With regard to developing their entrepreneurial skills through the channels of modern education, the students expressed positive opinion for this Programme. They strongly believe that this distance learning programme provides the necessary support to them in undertaking entrepreneurial activities (54%). Moreover, the majority of students consider that the sector of Entrepreneurship and Governance has international tendency (60.9%) and its relative study is particularly essential in the modern executives of organizations (78.2%). Finally, the majority of participants believe that a Master's degree in Entrepreneurship is necessary in our days (82,7%).

Table 7 Questionnaire responses, Descriptive statistics: Curriculum and importance of attending this programme by means of distance learning education

Questions	Responses (%)					
	No opinion	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
I like participating in e-class		2.3		18.4	26.4	44.8
I believe that e-learning has become essential in our world				5.7	21.8	64.4
I like studying entrepreneurship	6.9	2.3	4.6	24.1	31	23
I believe that entrepreneurship is sovereign	5.7	1.1	2.3	21.8	35.6	25.3
The study of Governance is essential in modern executives	1.1		3.4	9.2	29.9	48.3
A master's degree is necessary	1.1			8	21.8	60.9

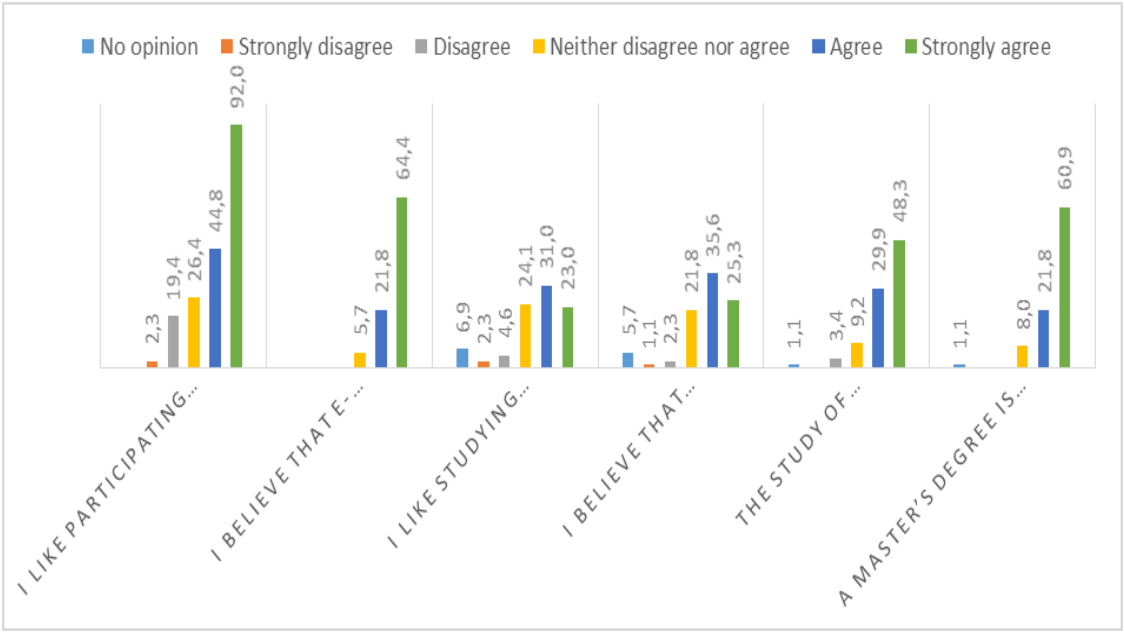

Figure 2 Graphic presentation of curriculum and importance of attending this Programme by means of distance learning education

As seen in table 8, the results for 81.6% of the participants who are not entrepreneurs, showed that the majority of the students are interested in entrepreneurship matters (42.5%). Furthermore, 20.7 % of the participants who are not entrepreneurs have a selective enterprising idea and are thinking of creating their own enterprise in future, so they have collected all the necessary information concerning the procedures of creating it. Moreover, they have located enterprising occasion (27.5%) and are following the evolutions in the enterprising sector (35.6%).

Table 8 Questionnaire responses, Descriptive statistics: If you are not an entrepreneur

Questions	Responses (%)					
	No opinion	Strongly disagree	Disagree	Neither disagree nor agree	Agree	Strongly agree
I am interested in entrepreneurship matters	9.2	6.9	6.9	16.1	25.3	17.2
I am thinking of creating my own company in future	11.5	18.4	14.9	16.1	9.2	11.5
I have collected all the necessary information concerning the procedures of creating a company	8	16.1	18.4	18.4	13.8	6.9
I have located enterprising occasions	8	17.2	12.6	16.1	19.5	8
I am following the evolutions in the enterprising sector	6.9	8	9.2	21.8	27.6	8
I have a selective enterprising idea	9.2	16.1	14.9	21.8	12.6	6.9

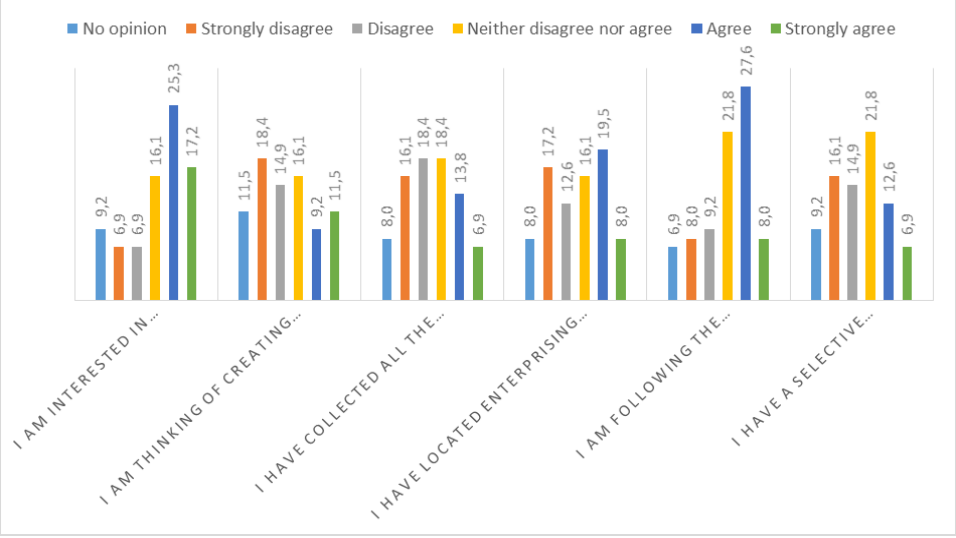

Figure 3 Graphic presentation of interests of the participants who are not entrepreneurs

5. Conclusions

This entrepreneurship distance learning programme deals with studying the tools to take a business idea, offer the resources to turn it into reality and make this idea a viable product or service. The traditional University programmes require the daily presence of students during

lectures and educational activities, while distance learning programmes are more flexible and students have the opportunity to combine studying with professional activities. Distance learning has similar benefits, appealing to those who want to continue to learn without disrupting their personal life, giving up full time work or having to travel. In doing so, the next generations of entrepreneurs will hold a sound base knowledge in order to face local, regional and international challenges.

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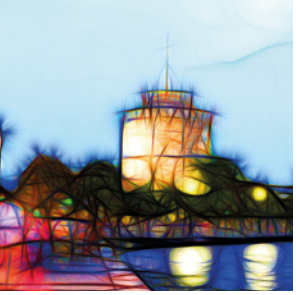

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KNOWLEDGE TRANSFER AND INNOVATION IN CROSS-BORDER COOPERATION PROGRAMMES BETWEEN FINLAND AND RUSSIA

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Cross-border cooperation (CBC) at the European Union's (EU) external borders has been promoted via programmes, such as the European Neighbourhood and Partnership Instrument (ENPI), funded jointly by the EU and participating countries. However, little empirical attention has been laid to these programmes in terms of their role in enhancing cross-border knowledge transfer and innovation, particularly in the field of tourism. To shed light on the issue, semi-structured interviews were conducted with representatives of (12 Russian; 12 Finnish) organisations that had participated in ENPI CBC funded tourism related Finnish-Russian cross-border projects. The results shed light on the possibilities of and obstacles to cross-border knowledge transfer and innovation. ENPI CBC programmes between Finland and Russia are highly relevant for successful cross-border knowledge transfer and innovation in the tourism sector: the projects were particularly successful in transmitting new service concepts and best practices across the border. While, for example, language issues and the differences in legislative systems between the two countries can constitute barriers for practical CBC, the dissimilarity between the actors in opposing sides of the border, is actually the main factor that facilitates and creates potential for learning, knowledge transfer and innovation to take place in the Finnish-Russian cross-border region.

Keywords
Cross-Border Region, Finland, Innovation, Knowledge Transfer, Russia

1. Introduction

The European Union (EU) has set up clear goals in becoming the world's leading tourist destination via, for example, promoting sustainable tourism, developing innovation in the tourism sector and setting up cross-border tourism initiatives. As such, it has been recognised that cross-border tourism can (potentially) address issues of peripherality and ensure transnational synergies leading to promotional and profile enhancing gains for the whole tourism sector of the EU. Therefore, the EU has produced guidance for best practices in tourism innovation and funded the development of sustainable transnational tourism products through different programmes and initiatives. At the same time, the EU has been committed to promoting sustainable socio-economic and socio-cultural development of non-EU regions for achieving the cohesion and cooperation goals of the EU and its neighbours. This cross-border cooperation (CBC) work has been most recently (2007–2013) funded through the "European Neighbourhood and Partnership Instrument" (ENPI) – replaced now (2014–2020) by the "European Neighbourhood Instrument" (ENI) – including support for tourism innovation projects [1-2].

Russian border regions have implemented programmes, with similar goals as in the EU, to promote regional social and economic development and the local tourism sector [3]. Additionally, Russia's central government has taken a close interest in funding CBC programmes and projects in order to act as an equal partner to the EU. Thus, while Russian policies for border regions are not dictated by the structural and cohesion funding policies similar to the EU, there is a mutual understanding that overcoming economic hardships in cross-border regions (CBRs) can harmonise the interests of Russia and the EU [4]. Similarly, CBC programmes have been neither included in the contemporary sanctions or countersanctions list of the EU nor Russia. It, thus, seems that the importance placed on CBC has not been affected by the current tense political climate between EU and Russia [5].

Despite the evident importance that the EU has placed on tourism-related CBC at its external borders (according to the KEEP -database around 16.8% of EU-financed CBC projects in the programme period of 2007–2013 were related to tourism), little academic attention has been given to the topic, except some case studies carried out in the Hungary-Slovakia-Romania-Ukraine [6] and in the Finnish-Russian [7] CBRs. These studies have, however, concentrated on (simply) describing or listing existing tourism focused ENPI CBC projects, rather than analysing their actual significance for cross-border knowledge transfer and innovation. This applies also to other borders besides the external borders of the EU: whereas the existing literature on cross-border tourism has generally concentrated on development, marketing and governance issues in cross-border destinations [8-10], the empirical literature on cross-border knowledge transfer and innovation within the tourism sector remains limited [11]. Therefore, by means of interviewing 24 participants of tourism industry related ENPI funded project at the Finnish-Russian CBR, this paper aims to:

- Identify the role of Finnish-Russian ENPI CBC programme in facilitating cross-border knowledge transfer and innovation in tourism
- Identify the factors that facilitate or act as barriers to cross-border knowledge transfer and innovation in the Finnish-Russian border region

Given the current challenge in facilitating collaboration across the Finnish-Russian border [12], this study provides deeper understanding of the barriers to cross-border knowledge transfer and innovation and implications for facilitating future CBC projects applicable particularly for collaboration in the external borders of the EU.

2. Study Design

The dissolution of the Soviet Union and accession of Finland into the EU have led Finnish decision-makers to endorse Finland's image as the "bridge" between Russia and the EU. This image has been supported by the evident and measurable increase in cross-border tourism and volumes of cross-border cargo and passenger traffic [13] – a development that has been, at least partially, facilitated by CBC programmes [14] As such, tourism has become a significant sector for local economies in the Finnish-Russian CBR since the collapse of the Soviet Union.

While as has been stated above, there is indeed only limited empirical evidence on CBC, innovation and knowledge transfer at the external borders of the EU, the notions of intensified cross-border interaction suggest that the conducted Finnish-Russian CBC programmes might have been particularly successful also in terms of learning and innovative outcomes. If this is the case, the experienced gained at the case study region will provide interesting insights for other CBRs. Additionally, the choice of the case study area was motivated by the alleged nature of the Finnish-Russian border area as one of the most challenging border areas in terms of CBC. Socio-economic disparities between the EU and non-EU countries have created highly asymmetric borders rendering CBC in the external borders of the EU more challenging than along the internal ones [15]. The cross-border disparity (in terms of GDP per capita) between Finland and Russia has been described as wider than in any other border region along the "East–West" divide in Europe [16]. Therefore, and for practical reasons (language proficiency of the research group), in this paper the focus is on investigating the knowledge transfer and innovation aspects of tourism focused CBC projects funded by the ENPI CBC programme – financed jointly by the EU, Finland and Russia – within three Finnish-Russian programme areas: 1) Kolarctic, 2) Karelia and 3) South-East Finland-Russia. The Kolartic programme area included also Norrbotten from Sweden and Nordland, Troms and Finnmark from Norway, but here the interest was laid on Finnish-Russian CBC.

Tourism projects from the programme period 2007–2013 and the three Finnish-Russian programme areas (all funded by the ENPI CBC programme), identified from the Keep -database, were screened for innovation related contents in their descriptions. The interest was laid on projects, which 1) specifically expressed, in their project description and/or among their achievements, to involve some form of innovation and 2) had ended quite recently (i.e. funded up until the end of the programme period). The latter point facilitated the contacting of potential interviewees, but allowed us to still adhere to a goal of querying whether CBC has continued even after the end of the funding period. In this way 19 tourism and innovation related Finnish-Russian cross-border projects were eventually identified with the aim of interviewing project leaders and participants from both sides of the border. The total number of conducted interviews, after some refusals and non-responsiveness, was 24

(12 Finnish and 12 Russian; 13 lead partners and 11 participants). In some cases, the interviewees had participated in more than one project.
The semi-structured interview framework included a set of questions related to the importance of the ENPI funding instruments as well as to the most important facilitators and the most severe barriers for cross-border knowledge transfer and innovation. The interviews (from 30 up to 80 minutes) were conducted in the native language of the interviewees (Finnish or Russian) on site or via telephone between August and December 2016 and transcribed soon after. The transcribed interviews were approached as texts. Thematic analysis was applied as an empirical tool to assess the textual data. The transcripts were read and re-read to gain a general interpretative understanding of the empirical material and coded into three main themes (and sub-themes): 1) The relevance of ENPI funding for knowledge transfer and innovation across the border (a. targets and achievements and b. innovation); and 2) Facilitators and barriers of knowledge transfer and innovation in CBRs (a. facilitators and b. barriers).

3. Results

3.1 The Role of ENPI Funding for Cross-Border Innovation

Targets and Achievements: Among the projects in our sample, whereas only a few were concerned with building up new attractions and tourism information centres or improving the existing tourism infrastructure in the region, most projects were aimed at softer human-capital related forms of cooperation. That is, most of the projects were aimed at promoting networking between local tourism actors (such as companies, local administrative organisations, etc.) as well as at providing them with training sessions, benchmarking trips and help in marketing, particularly e-marketing, and new (cross-border) product development. Similarly, several projects were involved in guiding local administrative organisations in tourism-related strategic regional planning. The interviewees were generally quite happy with what their projects had accomplished. However, one problem that the projects faced was the radical change in the operational environment, towards the end of the programme period, that the local tourism actors were engaged in. This naturally relates to the Ukrainian crisis and the resultant political atmosphere, the subsequent economic sanctions and the weakening of Ruble, which led to a drastic drop in the numbers of (cross-border) tourists in the programme areas and into difficulties in securing further/alternative funding and investments. However, this is something that the project participants had very little control over and generally considered that CBC is continuing in the CBR despite the macro-political changes. As such, the programme was viewed very useful to the regional development of Finnish-Russian borderlands.
It was unanimously agreed that the projects, targets and their achievements would not have been initialised, carried out and achieved without the funding provided by the programme. Some smaller parts might have been carried out, but in a different way and over a longer time period, if relying on budget funding or alternative funding sources. The fact is that there seems to be no funding mechanism like the ENPI programme, which would allow both sides

of the border to act in the project as equal partners. Local and national funding sources do not usually allow international actors to receive funding or, at least, not in an equivalent volume to that of domestic organisations, since their primary aims are to support local/national development; not the development of regions in other countries. Again, according to the interviewees local and national funding sources generally award smaller grants. As such, it was considered that ENPI funding, which facilitated the inclusion of a wide set of expertise from both sides of the border, leads to better outcomes than projects carried out with local or national funding.

Finally, most of the Russian interviewees noted, that national funding in their country is more commonly directed at concrete infrastructure improvements and not as such to softer human and social capital aspects of regional development, which lie in the heart of many EU-funded programmes. The focus on softer aspects of CBC was generally viewed as very positive, since compared to infrastructure projects developing human and social capital was considered a more sustainable way to develop long-lasting links and continued cooperation across the border. Consequently, most of the interviewed organisations had continued the cooperation (at least informally) across the border after the projects officially ended. It was however repeated, that it is difficult to find funding sources that would fit CBC, since national funding commonly promotes domestic over international cooperation. Therefore, the interviewees were anxiously waiting for the opening of the next Finnish-Russian CBC programme period financed by the EU, Finland and Russia (i.e. ENI).

Innovation: The interviewees perceived that most innovations introduced or implemented would not have occurred without the ENPI funding. Particularly, the Russian partners and firms benefited from, transferring, adapting and implementing best practices and adopting existing tourism products and services from Finland. For the Finns, the projects were not always considered (that) innovative, since Finnish firms had already been well acquainted with the methods, products and services, introduced in the projects: most of the Finns considered the innovations to be small incremental improvements. Therefore, some of the interviewees viewed their project outcome as innovation diffusion rather than actual innovating.

The interviewed Russian project partners considered that the projects resulted in several innovations that were introduced in the Russian side of the programme area for the first time by the projects. As such, the innovations were, thus, new to the (Russian side of the) region. These innovations were mostly related to common cross-border e-marketing and the application of mobile technologies, new (cross-border) tourism products and services (e.g. travel routes) and ecologically efficient technologies (e.g. in the waste management of tourist attractions/facilities). A commonly cited process innovation was the new cooperative working methods, that is, the way that the tourism entrepreneurs were encouraged to network and cooperate. Particularly in the Russian side – where collaboration between tourism firms was viewed to have been rather uncommon – this was considered as a novel approach. The future potential of these innovations were considered in various ways. Most innovations had a clear future potential and were still available in the market, whereas others required further development and funding to remain operational. However, many of the Finnish partners expressed some scepticism towards the successfulness of their projects' sustainability in

terms of the created innovations. They were concerned with their innovations remaining up-to-date, competitive and viable, after the projects had ended.

3.2 Borders as Opportunities and Barriers to Knowledge Transfer

Facilitators: The lead partner and project managers were highlighted as key figures in the projects. Their project management capability was considered to be essential for good performance and facilitating cross-border knowledge transfer. Existing cross-border contacts were commonly mentioned as an underlying condition for building trust, which was considered the most important factor for successful CBC and knowledge transfer. Having personal contacts was considered more acute than cooperation between organisations, since trust between individuals is not affected by movement of these individuals between organisations. Further, organisational cooperation was viewed as more formal and less effective than that, which is based on personal contacts:
Differences in culture, involved sectors, educational backgrounds or competencies between the project participants seem to facilitate cross-border knowledge transfer: similar competencies can ease the practical side of cross-border interactions. However, according to the interviewees it was the differences in culture and competencies, which actually facilitated learning and cross-border knowledge transfer in the projects. Notably, the projects were particularly successful in unidirectional transmission of new service concepts, technologies and best practices from the Finnish side to the Russian one, whereas the Finnish partners benefitted from new knowledge on networking, conducting business and dealing with administrative issues in Russia.
Barriers: The Russian partners where overall quite satisfied with the cross-border knowledge transfer processes within their projects, whereas the Finnish partners were a bit more sceptical concerning the successfulness of cross-border knowledge transfer and identified some key issues that, in their opinion, constitute barriers to it. Language issues were considered to be among the core barriers for cross-border knowledge transfer particularly by the Finnish interviewees. The Finns emphasised that it is important that they need to have personnel employed in the project (preferably as managers), who have knowledge of the Russian language and culture since English alone was not sufficient to communicate and since it facilitated cross-border knowledge transfer with the Russian project partners and other stakeholders such as entrepreneurs and regional administration.
The business culture between the Finnish and Russian side of the border was described as very different; Finnish firms tend to plan more ahead, whereas Russian firms are more spontaneous and not that accustomed to long-term planning. Another often mentioned drawback between Russian and Finnish mentalities and cultures is the Finnish way of doing things in advance, whereas Russians are more inclined to do “everything on the last day”. These issues can lead to problems and can thus potentially act as barrier to cross-border knowledge transfer highlighting the importance of cultural sensitivity and understanding.
The Russian legislative and administrative system was descripted by many (both Finns and Russians) as more bureaucratic than the Finnish system. For example, there are significant differences between the Finnish and Russian accounting rules, which led to practical problems related to auditing. Again, the above mentioned lack of funding opportunities and

private investments for the tourism industry was considered to be a major obstacle for the promotion of cross-border tourism and knowledge transfer within the sector. Contrarily, visa requirements and practical issues concerning the crossing of the border were almost unanimously ruled out from the list of barriers to cross-border knowledge transfer: only a few of the interviewees had experienced some difficulties with the custom offices, when moving project material across the border. Generally, for most of the interviewees, living and working in border regions, the rules and practicalities of crossing the border is "business as usual" and, thus, permeability of the border (i.e. the ease of crossing the border) for people living and working in the border region does not seem to be an issue. Therefore, the more problematic differences in the Finnish-Russian border seem to manifest in the form of institutional, such as business culture related and legislative, differences.

4. Conclusions

This paper set out to evaluate the role of CBC programmes in terms of their potential role as a facilitator of cross-border knowledge transfer and innovation. The empirical material was collected with semi-structured in-depth interviews with participants from the Finnish-Russian ENPI CBC programme, who were engaged in tourism related projects. Altogether 24 interviews (with 12 Finnish and 12 Russian partners) were conducted. The main results can be summarised as follows. Firstly, since local and national funding sources commonly favour domestic over international cooperation, the role of cross-border focused ENPI funding in achieving the innovation related goals of the projects was considered as of paramount importance: the inclusion of a wide set of expertise from both sides of the border leads to better-quality outcomes. Secondly, when it comes to barriers for cross-border knowledge transfer the most commonly identified issues consisted of differences in language competencies, business culture and legislative and administrative systems and the lack of funding opportunities and private investments for tourism, while cross-border differences in culture, involved sectors, educational backgrounds and competencies were seen to be the most important factors facilitating cross-border knowledge transfer.

Based on the results of this paper, unlike in the case of project-based funding obstacles – short-lived funding periods, bureaucracy, low interest on participating on CBC and the consequent low impact of CBC [17] – reported at internal EU-borders, the interviewees generally considered their Finnish-Russian ENPI funded tourism projects as highly impactful. They had either continued this cooperation or were actively seeking for further collaboration. Thus, despite the current political climate "there is a strong will to collaborate on both sides of the border".

As has been indicated by earlier literature on cross-border innovation cooperation, the actors involved in CBC projects need to be similar enough to be able to cooperate across border, but not too similar, since then there would be little to learn from each other [18]. This also applied in the case of the Finnish-Russian CBR: the dissimilarities between neighbouring border regions create some practical barriers for successful CBC, but the related differences between the actors were the very essence that drives the cooperation for cross-border knowledge transfer and innovation across the Finnish-Russian border.

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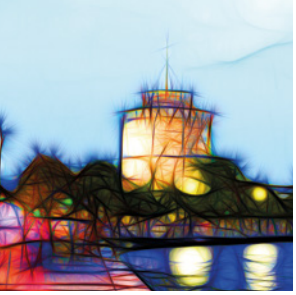

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CO-CREATION AS INNOVATION MODEL IN ICT BASED SERVICES

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Development of services in the modern economy requires a wide range of technological expertise that is very often above the expertise level of service providers. Therefore, the innovation processes in services increasingly imply connections, linkages and cooperation of several organizations in different stages of the new service development (NSD) process. Connecting major service providers and companies specialized in ICT development involves intensive collaboration in all stages of the innovation process, from initial ideas to commercialization. Based on the findings in practice, theoretical knowledge and attitudes offered by literature, this paper presents a new model of innovation processes. The model is related to service innovations based on the development and application of ICT. The model identifies three groups of activities: 1. designing new services, 2. development of new services based on the ICT application and 3. introduction and commercialization of new services. The new model provides detailed insight into the stages that are carried out in service innovation process and stages that imply co-creation in ICT based service development.

Keywords
Co-Creation, ICT, Innovation Model, Innovation Process, Service Innovation

1. Introduction

Different approaches to studying innovation in modern environment are present nowadays more than ever [1]. Contemporary studies usually rely on models that take into account the complexity of innovation emergence in dynamic conditions. Today, innovation is studied as a process that usually includes a number of people of different specialties, and very often incorporates partnership of several organizations. All participants of innovation process have to be effectively directed and managed. This stresses the need for a multidisciplinary approach in innovation management - when studying innovation, as well as in defining process and management models.

2. Innovation models

Numerous models of innovation processes have emerged as a result of efforts to establish a certain connections, relationships and patterns in order to determine the innovation process, reduce its uncertainty and random nature, which would result in easier and more efficient management. In the analysis of innovation processes today, it is a common approach to start with linear models, that were developed in the early and mid-twentieth century, through the partially parallel models, towards contemporary network models [2,3].
When thinking about innovation management, at first glance it may seem that it is impossible to manage something as complex and uncertain. The complexity of this aspect of management can be displayed on product development, where is necessary to meet three sometimes conflicting objectives [4]: maximize compliant with the requirements of the customers, minimize the development cycle and control development costs. Innovation process is characterized by uncertainty and seemingly random nature. The fact is that many innovative project experience failure, but some bring a huge success and profit to organizations and individuals. Management of innovation projects in the organization starts from a very clearly defined innovation process with key phases and operations. This approach enables necessary investment and allocation of resources in different phases (human, material, financial). It enables to determine timing and results that are clearly associated with individual phases. Successful organizations have developed their own models of innovation, so although there is never a guarantee, however, implementation of specific activities could increase the probability of success.

2.1 Key features of service innovations

Service innovation may include significant improvements in the delivery of services, adding new functions or characteristics to existing ones, or the introduction of entirely new services. Innovation processes in services include new or significantly improved methods of creating and providing services. These may be significant changes in equipment and software in the service-oriented firms or changes in procedures and techniques used in service provision. Process innovations also include new or significantly improved techniques, equipment and software to support activities such as procurement, accounting and maintenance. Implementation of new or significantly improved information and communication technology - ICT is seen as a process innovation if it is intended to improve the efficiency and / or quality of support activities. There is a permanent dilemma and controversy on whether the service innovations can be studied using the same concepts and tools used for the study of product innovations. Intangible nature of services output implies that it is usually difficult and sometimes impossible to evaluate the service before or even after the purchase. It is a challenge for marketing professionals to prove the benefits of service innovations, to make the intangible to be tangible and to speed up the evaluation process for the customer. Simultaneity, as another feature of services, means that provider and the client have an active role in the realization of services and are important for service innovation adoption. The vast majority of services involve close interaction with customers, which means that service innovations not only improve services, but also the form of interactive relationships with customers.

2.2 Co-creation in service innovation

Co-creation has emerged, in recent years, as an important management strategy for enabling firms to be innovative [5]. Generally, co-creation is possibility to improve innovation capabilities and enhancing innovation process. Co-creation brings new opportunities for enterprises and practices for collaborating with partners are in the focus of contemporary research papers [6]. For example, a morphological approach can be used to explore how a lead firm can identify attractive co-creation opportunities [7].
Customers, suppliers, government, competitors, NGOs and other groups involved in co-creation can contribute to the final product or service. Co-creation can lead to new distinctive business models defined as 'the design or architecture of the value creation, delivery and capture mechanisms' [8, 7]. Users have a special role in service innovations. They can be included in different stages of innovation process, from generating and selecting ideas, through concept development, testing and commercialization. Ideas generated by users proved to be more original and valuable, but sometimes could be difficult for implementation [9]. Internal marketing of service innovation ideas inside the organization of service provider is of crucial importance for the success [10].
Firms increasingly co-create knowledge with external stakeholders during the innovation process in order to expand their knowledge base. These stakeholders can be not only customers, but other organizations [11, 12]. In the field of inter-organizational cooperation co-creation involves different companies and institutions. an increasing diversity in stakeholders involved during the innovation process, needs to go hand-in-hand with an increased investment in developing stakeholder co-creation capabilities [12]. Service innovation is seen as a means to improve companies and customers' co-creation of value [13]. Research question: Define the model of service innovation process that implies co-creation of ICT based innovations.

3. Research method

We conducted four case studies on Serbian market, using a universal approach to studying the innovation process, but also taking into account specificity of environment and operating in a developing country. In selecting innovation projects to be subject of the study we were searching for the cases where the large firms, as recognized service providers in the market, were linked with smaller software companies to develop new services based on modern ICT. The case study method was used as it is recommended as adequate method when there is little or no available empirical research relating to a particular topic, i.e. when the survey has exploratory nature [14, 15]. In defining the stages of innovation process we relied on an approach developed by Van Riel and Lievens [15] in which they observed how the service organization develops and re-define the concept of service, and not how the process outcome , i.e., new service offer, goes on the market. This approach provides universality, focusing on the innovation process, rather than specific market aspects.
The units of analysis in this study were individual innovation projects selected on the basis of the research questions, and respecting the following principles: projects were implemented in different areas of services, each project involved several organizations, development and application of modern ICT was the base for service innovation, outsourcing was used for ICT development. The selected projects represented me-too innovations, i.e. services that were

already present in developed countries, but they were new to the Serbian market. In addition, the common features for all projects were: the need for shortening the development time, the need for using the latest knowledge and technologies, and the integration of complementary competencies of involved organizations. The study consisted of detailed documentation review for selected projects and structured interviews with project managers.

3.1 Case studies: New service development projects

Project 1 - Development of teletext: Participants in the project were leading TV station in Serbia and one of the leading bookmakers, as successful service providers, and two smaller companies that worked on developing software and hardware required for new service. After one year of cooperative work of four organizations, the new solution was obtained and implemented bringing a number of advantages over existing systems. The new system was based on open source technologies; teletext editor allowed easy creation of teletext pages and user-friendly interface has reduced the required technical knowledge to a minimum. Within just two months, three leading local TV stations have bought a new solution and implemented it immediately instead of existing. Later, new purchasers and users emerged in other countries in the region. Today the system is present on the leading TV stations in Serbia, Montenegro, Macedonia and Bosnian Federation.
Project 2 - Development of traffic cadastre: Traffic cadastre development project was important for transportation in Belgrade as a city with over two million inhabitants There was an evident need for service innovation by introducing modern ICT (software and hardware) in the process of recording, monitoring and maintenance of traffic signals. The participants in the innovation process were a municipal body in charge of Belgrade transport, as a service provider, and a smaller software firm which developed the system for a new service supported by modern ICT. Development lasted from September 2005 to June 2008. The new solution had accessible and understandable interface that was tailored to the user needs i.e. for the purpose of effective and timely maintenance.
Project 3 – Development of live betting: After market analysis, experts from the leading bookmaker company in Serbia noted the existing need to do some business improvements with real-time insight into the games that were played in about 200 betting shops in different parts of the world. This was important in order to see the players' preferences and to adjust bids accordingly. The system had to display statistics in real time, as well as the results and costs of all the games offered. The participants in the project were bookmaker, as a famous provider of betting services, and a small software company. Betting offer was variable and client could make the offer, or could buy already predefined. Various types of financial statements could be made at any time. The new system supported standard betting, live betting and Internet. New system was used at 250 sites in 7 different countries (Serbia, Montenegro, Bosnia, Lithuania, Romania, Cyprus and Tanzania).
Project 4 - Development of mobile marketing via Bluetooth technology: Experts from a mobile operator company, following current trends and retail market development in Serbia decided to develop a new service to support mobile marketing via Bluetooth technology. Mobile marketing via Bluetooth technology appeared as a service innovation, through which other firms, as operator's clients can be closer to regular and potential customers. Development of new solution was done through cooperation of recognized mobile operator and smaller software company. After development and adoption of new system it was applied in a shop in

central Belgrade. The plan was to expand this service to third parties, to other firms, which, as users of new services, would represent their own products and services to owners of mobile phones through innovative marketing approach.
After detailed analysis of projects' documentation, interviews were conducted with project managers in order to determine the roles of organizations during the new service development process - from first idea to commercialization. The results are presented regarding all innovation process stages, from the first idea generation stage to commercialization.

4. Results and discussion

Conducted research showed that connecting major service providers and companies specialized in ICT development involves intensive collaboration in all stages of the innovation process, from initial ideas to commercialization. Co-creation is needed as services are increasingly dependent on a wide technological knowledge base, and service life cycles are getting shorter. Cooperative development processes, enhanced by ICT, have become a way of linking complementary knowledge and skills in order to ensure quick and high quality response to existing and anticipated future market needs [16].
Based on empirical findings from the case studies in Serbia, some good practices can be recognized and defined as recommendations for innovation management:

- Initial stages of innovation process require effective linking of complementary knowledge and competences of participating organizations in order to get a visionary approach to service development. In addition to existing and obvious needs and requirements, it is of high importance to recognize or predict customer needs in the future, as this can provide expansion into new markets. The specific objectives of cooperating organizations can be opposed, and it is necessary to provide accurate written contracts at the beginning of a project. These contracts should define intellectual property rights, obligations of participants involved and possibilities to further distribute the new system or its parts and concepts.
- Generating and evaluating ideas for new service has to integrate knowledge and experience of service provider and expertise of ICT firms. As a part of environmental analysis, management should forecast potential resistance to new services on the market. Resistance could occur in service provider as well as the stuff could resist to new ways of doing their job. Management should consider the impact of resistance on innovation overall success and take this into account when selecting the ideas. In addition to expertise and all information about the environment, management should have a certain degree of intuition and vision to support the selection of ideas that have a greater chance to succeed.
- Special attention should be paid to two main stages: defining user requirements and their translation into project requirements. These two stages affect the project time, later feedback relations and therefore the costs and the results. Requirements must be precisely and correctly defined, which requires adequate knowledge and competence of participants. Misunderstanding between individuals who define requirements and those who implement them, can threaten the success of the entire innovation process. There is a need for extensive consultations of experts from business service providers and ICT

experts in order to ensure understanding of the requirements and future operations for all participants. The result of this stage should be a document with specification requirements to show the features the new system should provide, not how to achieve this.

- There must be at least two iterations to coordinate user requirements and ensure their proper translation to project requirements, before proceeding to the next stage. Any work based on assumptions requires subsequent return to the previous stages for corrective actions. It is necessary to precisely define all the terms and concepts in the specifications, especially the closely-expert, so that development teams perfectly understand what should be done.
- When it comes to the testing stage, standard approaches are difficult and sometimes impossible, due to the specific nature of services. Anyhow, some internal testing, simulations and role playing can be done. Training the employees at service providing organisation can be very simple task in a form of oral or written instructions, or one-day training. Sometimes, it can be demanding, when it is necessary to organise weeks of courses, to provide resources for training, to organise travelling, visiting trainees etc. When there is a need to train many people, it is preferable to conduct training in several stages and include employees who have successfully completed the training into the training process.
- Marketing of new services requires specific approach, due to intangible nature of services. It is important to have adequate internal marketing at service providing organisation and to ensure the acceptance of new service. When ICT development for a new service is performed by outside ICT firm, it is necessary to provide adequate maintenance contracts. These contracts are binding software engineers to respond to unforeseen situations and to eliminate problems. Sometimes it is adequate to have long-term agreements on cooperation in order to continue the process of developing ICT and to respond to new needs and requirements.

4.1 Circular co-creation model of innovation process

Based on the findings in practice, theoretical knowledge and attitudes offered by literature, a new model of innovation processes is presented [17]. The model is related to service innovations based on the development and application of ICT. The model identifies three groups of activities: 1. designing new services, 2. development of new services based on the ICT application and 3. introduction and commercialization of new services.

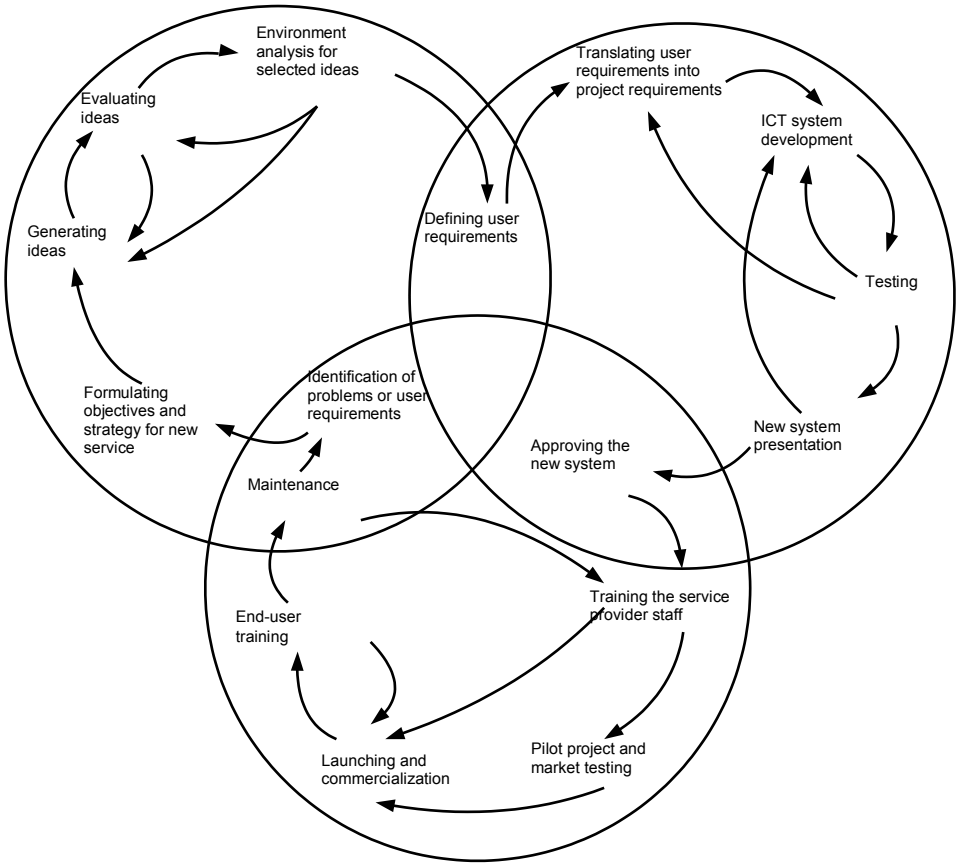

Figure 1 A co-creation model of innovation process in services (*Source: author)*

Development of new services based on the ICT application are done in partner organization and these activities involve many co-creation mechanisms and feedback loops. Upper right cycle is involves cooperation of partners through: Defining user requirements, translating user requirements into project requirements, ICT system development. testing, new system presentation and approval.

5. Conclusions

The application of presented model is seen primarily in identifying, monitoring and management of innovation process phases, in service innovations based on introduction of modern ICT. In comparison with other models, the new model: Provides detailed insight into the stages that are carried out in service innovation process; Provides a visual overview of the phases and feedbacks, thus creating conditions for better management; Presents the basis for innovation management model, which indicates the key capabilities that need to be developed in each stage; Provides a systematic approach to managing innovation process, aimed to the best use of the resources; Indicates connections that exist between the phases of designing new services, development of new ICT-based services (which may be the subject of outsourcing) and introduction and commercialization of innovations.

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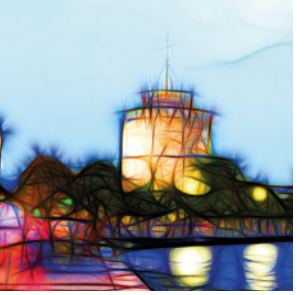

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GENDER ISSUE IN THE PROCESS OF INNOVATION: THE CASE OF THE POLISH ENTERPRISES OR THE CASE OF POLAND

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The processes of innovation and scientific research are not gender-neutral activities. And, even if science through its search for objectivity tends to dismiss the gender dimension, it is deeply embedded in the way we do science and develop new technologies, influencing the entire process of innovation [1 p. 187]. Thus, learning about the gender dimension of the process of innovation would seem to be important. Integrating gender in research requires a deep transformation in research design, as well as the paradigms and concepts underlying the research design. This may be the reason why research on gender and innovation has not been extensive. In this paper, we would like to present outcomes of the survey conducted in enterprises that are beneficiaries of the EU Innovative Economy Programme in Poland. In the survey the research team has studied the importance of factors gathered in five areas in the process of innovation: work environment; personal qualities; abilities, skills, competences; attitudes and values; roles and behaviours. The objective of the paper is to show that the process of innovation is not gender neutral, and that different characteristics, behaviours, skills, and roles determine innovative activity by men and women.

Keywords
Gender, Innovative activity, Process of innovation, Work environment

1. Introduction

Innovation is perceived as an equivalent to something new or modified [2]. The processes of innovation and scientific research are not gender-neutral activities. And, even if science through its search for objectivity tends to dismiss the gender dimension, it is deeply embedded in the way we do science and develop new technologies, influencing the entire process of innovation [1]. Thus learning about the gender dimension of the process of innovation would seem to be important. Integrating gender in research requires a deep transformation in research design, as well as the paradigms and concepts underlying the research design. This may be the reason why research on gender and innovation has not been extensive.

In the research project on Innovative Gender we are exploring the unique features of women and men that influence the process of innovation. In the project we conducted studies focused on innovativeness and creativity from the gender perspective, looking at the relation between gender, research and innovation. In this paper we present outcomes of the survey conducted in enterprises that are beneficiaries of the EU Innovative Economy Programme in Poland. In the survey we have studied the importance of factors gathered in five areas in the process of innovation: work environment; personal qualities; abilities, skills, competences; attitudes and values; roles and behaviours. The objective of the paper is to show that the process of innovation is not gender neutral, and that different characteristics, behaviours, skills, and roles determine innovative activity by men and women.

2. Literature Review

Since our research project focuses on gender and the innovation process, it is worth starting with the definitions of the main concepts. Innovations are defined in the classic definition by Schumpeter [3] as new combinations of production factors such as the production of new goods, introduction of new processes, opening of new markets, access to new sources of raw materials and intermediates, and re-organization of an industry. Therefore innovations range from product, service, process, position, strategic, governance or rhetorical propositions, and as to whether they are revolutionary, radical, emergent or incremental [4].

As Teresa Amabile has stated [5], all innovations begin with creative ideas, and successful implementation of new programmes, new product introduction, or new services depends on a good idea. In their opinion [5] creativity is the production of novel and useful ideas in any domain, and innovation is the successful implementation of creative ideas within an organization. Nevertheless, innovation cannot be reduced to considerations around creativity only, since new ideas are merely the first step on the road to creating a successful innovation [6].

Innovation is gaining attention among researchers. However, cross-disciplinarily and the increasing number of publications on innovation make it a difficult research field to survey [4, p. 163]. In our research here, we have focused on one of the aspects of innovation – the influence of diversity. Studies suggest that there is a positive relation between diversity in the firm's knowledge base and their innovative capacities. Employee diversity creates a broader

search space and makes the firm more creative and open towards new ideas. Diversity increases a firm's knowledge base through an increase in the interaction between different types of competences and knowledge. Thus employee diversity has a positive effect on innovation [7, p. 500]. The aspect of diversity that is of our interest is gender diversity.

A number of studies and reports have stressed the acute problem of women's underrepresentation in science in the business sector [8]. The results of international empirical comparative studies indicate that, in general, there is a clear statistical pattern that women are less involved than men in the creation of scientific and industrial knowledge [9, 10, 11].

These studies mainly concentrate on the representation of women and men in patent activity, while innovation literature has been criticised for not taking into account gender [6, p. 299].

Gender has not been a frequent focus of innovation-based research [13, p. 411]. The concept of gender and innovation has only recently gained a wider interest among researchers. One of the reasons for this lack of gender is the apparent invisibility of people in innovation [13, p. 237). They noticed that when people are not visible in the discourse, gender easily becomes invisible. Thus it is challenging to reveal the impact of gender on innovation when it is hidden within processes, organizations and systems.

Agnet Alsos [13, p. 239-240] conducted studies searching for articles in scientific journals from the Scopus database devoted to innovation and gender. While they were able to find 106 994 articles that included the word "innovation" in the title, abstract or as a keyword, but when they have combined the word "innovation" with the word "gender" the number of articles fitting the criteria decreased to 615, with no journal containing more than four articles of such focus. The number of articles combining words "innovation" and "women" was 1 306. This is however not the whole story, since a high proportion of these articles focusing on gender and innovation are within medicine, nursing, psychology or technology/engineering. They continue with the examination of economics literature. They find out that within economics the most prominent studies are those based on science and innovation areas, using quantitative methods including surveys and/or register data.

The European Commission [14] notices that the perception of technology and science is gender-blind. Innovation and creativity are also considered as such. Nevertheless, relationships between women and men can have an effect on seemingly gender-neutral contexts [15, p. 166]. Mariana Ranga and Henry Etzkowitz [16] take this argument further, claiming that innovation is not gender-blind, but rather inherently gender-biased, because of an implicit, socially constructed assumption that women are less innovative than men as a function of traditional gender relations, rooted in a social perception of technology as associated more with men than women.

Larry Foss [6, p. 301] cites Joan Acker [17], who claims that innovation processes are gendered. They also assume that the process of innovation is gendered in the way that the masculine ideas are implemented to a greater degree than the feminine ones. Following the argument that the likelihood of introducing an innovation is greater in organizations in which minority group has a critical mass to contribute to the innovation process [7], in a male-dominated organization, gender has a moderating effect on the relationship between idea generation and implementation because women employees will face more hurdles [6]. Research shows that creative performance requires both masculine and feminine components [6]. Christian Østergaard [7] study shows a strong positive and significant

relation between gender diversity and innovation. The results of that study show that very low or very high levels of diversity are not significantly different from each other, nevertheless a moderate degree of diversity (where a minority group has a critical mass to contribute to the innovation process), appears to have a higher likelihood of introducing an innovation.

Agnete Alsos [13, p. 243] noticed that the combination of adopting the perspectives of gender as a variable and innovation as a result is probably the dominant approach in empirical research on gender and innovation. This perspective is reflected in studies of innovation in male- and female-owned businesses, as well as in the literature on gender differences in patenting and commercialization in the university context. Larry Foss [6] used gender as a variable in an innovation process perspective. They have shown that women are equally innovative in generating new ideas as men, but their ideas are less frequently implemented in the organization. The gender dimension of innovation is usually considered to be a peripheral element of the process, which narrowly focuses on issues like inclusion/exclusion of women in research and development, or innovation. Women's role in innovation is often not seen as a part of the process, even when they are a key link in the chain [16]. Rae Cooper [18] explains that women are not perceived as innovators, and consequently their ideas do not get heard, or are deemed inferior to men's ideas, and therefore never proceed to the implementation phase. Agnete Alsos [13, p. 244] conclude that this is not women that are lacking innovation capability, but organizational practices that condition or inhibit women's innovative behaviour.

Teresa Amabile [19, p. 1154-1155] assume that social environment can influence both the level and the frequency of creative behaviour. Larry Foss [6, p. 301] underline that the structure of organization and work environment are conducive to the process of innovation. Colleagues' mutual consideration of ideas and support for innovation has been demonstrated to positively affect innovative behaviour [6]. Work pressure also influences creativity. This influence might be either positive, or negative. It depends on the degree of work pressure – extreme workload pressure undermines creativity, while a certain degree of pressure has a positive effect [5]. Research by Larry Foss shows that work pressure has a positive effect on the generation of new ideas [6].

Anna Dyląg and Michał Szafrański focus their research on personal qualities and values disaggregated by gender [19]. They conclude that women and men share some values, such as self-respect, health and honesty. But there are also certain differences between them. Women value meaning in life, while men point at inner harmony. What is interesting men indicate values that are considered by women to be least important, namely social power, authority and sacrifice. In relation to innovativeness, there were no statistically significant differences between men and men not only in creativity, but also in such values as curiosity and openness to change. Other research concerned abilities, skills, and competences and reported that in European Union women account for 40% of all scientists in higher education, and 46% of all PhD graduates [20]. Danuta Kopycinska [21] and Anna Zachorowska-Mazurkiewicz [22] write about labour market segmentation, in which women concentrate in areas such as education and health care, and men in construction sector. All the areas researched have a potential impact on innovative activities by women and men.

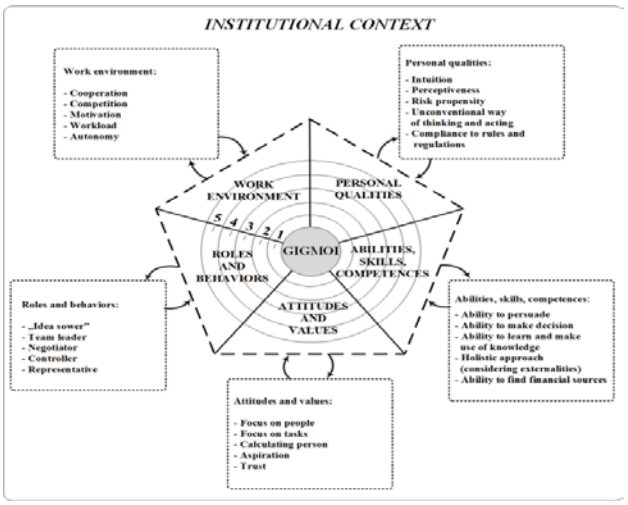
The different roles and positions of women in society could determine innovative activity by women [12]. As mentioned above, attitudes and values also play important roles regarding innovative activities. Female managers have a collaborative and cooperative approach in

leading organizations, and female business owners have a stronger preference for collaborative network orientation than their male counterparts [6]. It also appears that "competition" is often associated with the male-gendered element of the innovation process, while women are perceived more as "consensus builders" [16, p. 3).
Since innovation is related to entrepreneurship, work-family life conciliation can also be expected to be an obstacle to innovative activities by women. Thus, it could be expected that the more institutions help to conciliate family and working lives, the more innovation will be carried out by women. Also, many women in science-related careers leave before arriving at their hypothetical glass ceiling for reasons such as job structure and flexibility, and the proportion of women and men in the workplace. Thus, the more egalitarian the working environment, the more innovation is produced by women [12, p. 413).

3. Materials & Methods

3.1 Text

The literature review has inspired the investigation concerned with gender and innovation. In order to investigate the significance of gender in the process of innovation, the concept of the innovative genome [23] was adopted. To research gender relations in the process of innovation, the original model had to be transformed (figure 1), thanks to which a new formula and research capabilities were obtained, leading to original results.



Source: Own elaboration

Figure 1 Genomic integrated gender model of open innovation

The innovation genome comprises of five basic stages of the process of innovation: (1) generating ideas, (2) idea accumulation and protection, (3) choice of best ideas to be implemented, (4) development, (5) innovation (circles from 1 to 5) with five socio-psychological areas superimposed on it: (1) work environment, (2) personal qualities, (3) abilities, skills and competences, (4) attitudes and values, (5) roles and behaviours. After the

changes it is possible from this model to extrapolate and connect the two main economic categories which form the subject of the studies undertaken, namely the *process of innovation*, based on creativity and its determinants, and *gender* from the perspective of the diverse and complex relationship between men and women and the importance of their participation in the process of innovation.
Previously obtained results to be published [16, 24] indicate that the work environment (atmosphere, relationships, attitudes, incentives, rewards), personal qualities, roles, abilities and skills are the most powerful determinant of the efficiency and effectiveness of the innovation process; 50.06% women and 57.20% of men indicated these conditions. Institutional solutions promoting innovative activities are much less important. For this reason, it is necessary to investigate internal environmental the process of innovation. Therefore, the following assumptions were adopted: the process of innovation is not gender neutral (H1), profiles of men and women in the process of innovation process can be described using a specific characteristics, behaviours, skills, and roles (H2), specific characteristics, behaviours, skills, and roles are different for men and women.

3.2 Text

The research covered 1 164 Polish innovative companies – beneficiaries of the EU Cohesion Policy 2007-2013. The survey was conducted between 15 October and 15 December 2015. The respondents were men and women employed in these enterprises involved in different ways in the process of innovation. They played a wide spectrum of roles in the process of innovation, from team member to managerial positions. The questionnaire was distributed independently to women and men. As a result, two independent samples of data has been created.
In addition to the gender, age, and education questions, each questionnaire contained questions related to all 25 variables in the process of innovation (annex 1). Each variable represents one quality, attitude or behaviour characterized by a single person (both women and men) involved in the process of innovation. Each question was presented as a five point option from strongly disagree to strongly agree for the variable's (quality, attitude or behaviour) importance in each innovation process stage (i.e. Likert scale, scoring 1 to 5). In each case, the scores summarized the answers in all five stages of the innovation process. Five hundred sixty two cases have been collected in two independent groups of women (N=283) and men (N=279), which form two independent data samples. In the group of women, age ranging from 18-64 (M=33, SD=7.7) – 86% of women participants possessed higher education. In the group of men, age ranging from 18-65 years (M=36, SD=9) – 87% of men participants had higher education. The initial analysis of samples allows the conclusion to be drawn that the samples are appropriate for using with an exploratory analysis method [25, 26, 27, 28].

3.3 Text

The conceptual framework of the model (figure 1) described by the pre-25 variables has been verified. The achievement of specified research objectives has been made possible by

explaining in a statistically significant way the variance of each variable (not only shared variance) and the emergence of a set of groups of variables, which are the carriers of information and best explanation of the model constructed, where a loading value for each variable in the group explained the level of participation of women and men in the innovation process. Thus the underlying research question would then be: What is the set of variables, their loading values and component structure which provide the best statistically significant explanation of the model built?

Applying the selected statistically significant variables and components provides more accuracy for the model developed in the present study. Both conceptual research context and preliminary analysis fulfil the assumptions for using Principal Component Analysis (PCA) [29, 30, 31, 32]. In order to verify the model SPSS 23 and Amos 23 have been used. A Shapiro-Wilk's test ($p>.05$) [33, 34] and a visual inspection of their histograms, normal Q-Q plots and box plots showed that among of all 25 variables covered by the test, none of them – for either women or men – were approximately normally distributed. The calculation results closest to normal distribution was identified in the women sample for the variable named "Negotiator", where for the Shapiro-Wilk's test significance value = 0.019, with a skewness of -0.207 (SE=0.145) and a kurtosis of 0.166 (SE=0.289) [35, 36, 37]. In conclusion, of the preliminary considerations, the samples data are not normally distributed, but suitable for one of the exploratory analysis methods to be used.

The eighteen out of the twenty five initial variables for the women sample fulfil the best values of the parameters included in the PCA procedure. The visual inspection of variable correlation matrix reveal numerous correlations above 0.3 and there is no variable with all correlations below 0.3; the Determinant ($a=0.001$) fulfils no multicollinearity condition ($a>0.00001$) [32]. The Kaiser-Meyer-Olkin Test (KMO=0.919) allows the sample adequacy condition to be accepted (KMO>0.6) [39, 40, 28], with anti-image correlation matrix diagonal values (MSA>0.7) [38]. The Bartlett's Test of Sphericity p-value (Sig =0.000) fulfils the significance condition ($p<0.05$) [41] and validates the PCA procedure for the women sample. The Kaiser' criteria [42] (Eigenvalue>1), the Scree plot test [43] and the Monte Carlo Parallel Analysis ($p<0.05$ for thousand permutations) of the data set for non-normally-distributed samples [44] reveal three components at the 54.28% of total variance explained, which is an acceptable result in the humanities [45, 28]. Since the research is devoted to the human activity of women, which signify a coherent unity, the reasonable assumption is that the components can be correlated. Hence, in order to select the most appropriate rotation, both uncorrelated and correlated components were verified. Despite this assumption, using the Promax rotation with Kaiser normalization [46, 47, 48] allows the best results to be obtained. It also represents the model matrix of female participation in the process of innovation.

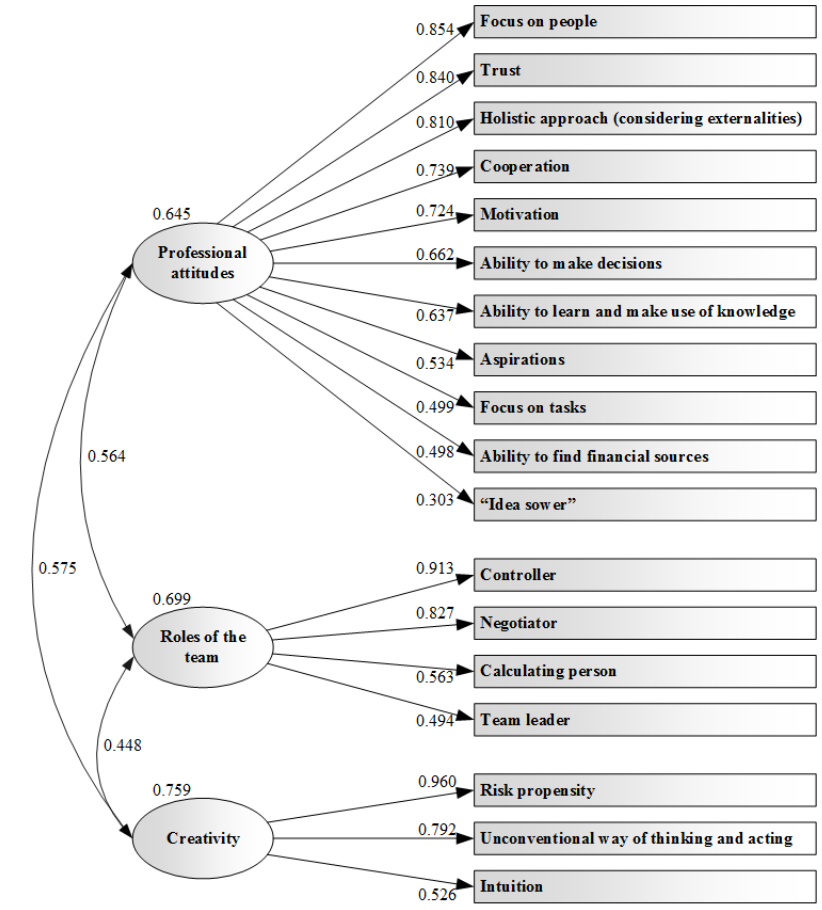
The seventeen out of the twenty five initial variables of the male samples fulfil the values of the parameters included in the PCA procedure. A KMO=0.896 shows the sample adequacy condition. The Bartlett's Test of Sphericity p-value (Sig =0.000) fulfils the significance condition and validates the PCA procedure for the male sample. The Kaiser' criteria

(Eigenvalue>1), the Scree plot test and the Monte Carlo Parallel Analysis ($p<0.05$ for thousand permutations) of the data set for non-normally-distributed samples reveal four components at the 56.08% of total variance explained.

4. Results

As a result of the PCA procedure, two models were obtained (Figure 2 and 3). The models take into account the variables after verification. The variables are grouped into three components (for women) and four (for men). In each of the components the values of the loadings indicate a statistically significant level of explanation of variance of each of the variables describing the roles, attitudes, and competencies of women as well as men involved in the innovation process in the companies investigated.

In the model for women, seven variables were considered statistically insignificant. These are: Competition, Workload, Autonomy, Perceptiveness, Compliance to rules and regulations, Ability to persuade and representative. In turn, in the model for men, eight variables were considered insignificant. These are: Cooperation, Competition, Workload, Perceptiveness, Risk propensity, Compliance to rules and regulations, Calculating person and Representative. Figure 2 (model 1) presents values of each variable loading in dedicated component. The component loadings value signifies the total variance explained for each variable included in the dedicated component (range 0-1). Components represents groups of variables which are qualifies, attitudes and behaviors of women in the innovation process.



Source: Author's work, with Amos use.

Figure 2 Women participation model in the innovation process

Based on the variables included in the components and their average loadings the components are: *Professionalism*, 0.645; *Roles of the team*, 0.699 and *Creativity*, 0.759. The average component loadings allow the variation explanation in the original data to be preserved while reflecting the scale of the item [49, 50, 51]. The Professionalism component contains eleven variables with a variance explanation ranked 0.303-0.854. The Roles of the team component contains four variables with a variance explanation ranked 0.494-0.913. The Creativity component contains three variables with a loading accounted 0.526-0.960. Table 1 represents the component correlation matrix of women's participation in the innovation process.

Table 1 Component correlation matrix of women participation in the innovation process of companies.

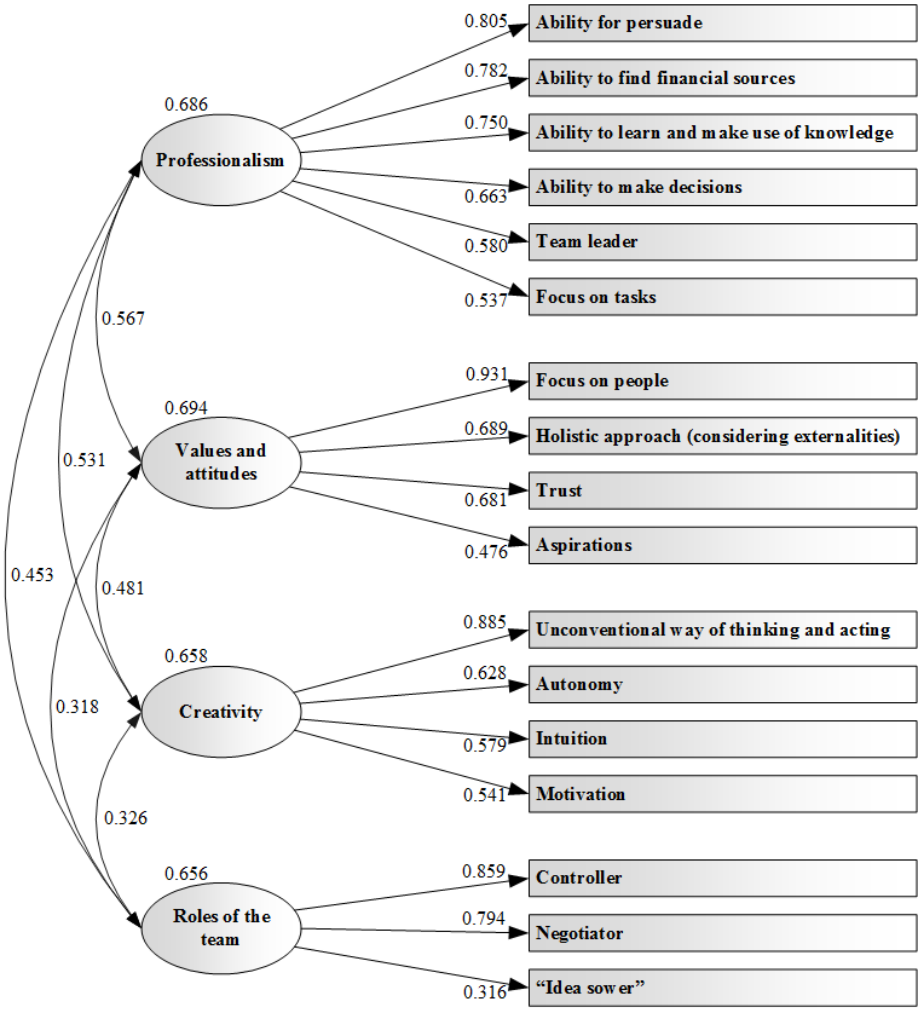
Component	Professional attitudes	Roles of the team	Creativity
Professional attitudes	1.000	-	-
Roles of the team	0.564	1.000	-
Creativity	0.575	0.448	1.000
Extraction Method: Principal Component Analysis.			
Rotation Method: Promax with Kaiser Normalization.			

Source: Author's work, with SPSS use.

The reliability statistics were validated by the Cronbach Alpha Test (α>0.6) [52, 53, 54, 55, 56, 57, 58]. The test results show the reliability of the results obtained and support the interval consistency of the items justifying their use in a summated scale. There is no way to obtain the value of the Cronbach Alpha Test higher in any of the components by removing a variable, which signifies optimum reliability.

The *Professionalism* component combines attitudes which can be characterized in two subsets of variables. The first is characterized by the external attitude of women towards collaborators participating in the innovation process. This subgroup includes: Focus on people, Trust, Holistic approach, Cooperation. The second subgroup exemplifies individual, personal skills and an internal attitude. This subgroup includes: Motivation, Ability to make decision, Ability to learn and make use of knowledge, Ability to find financial sources, Aspirations, Focus on tasks and be "Idea sower". The *Roles of the team* Component is characterized by a spectrum of roles ranging from the most formal, which is Controller, to the most informal, which is Team leader. A symptomatic discrepancy is noteworthy. On the one hand, the variable Trust has a very important place among the attitudes of women in relation to the environment, on the other hand, in the component *Roles of the team* the most prominent role of women is the Controller. How can we reconcile the attitude of Trust with the role of Controller? The informal role of the Team Leader is based on mutual trust, which must appear as if spontaneously in the course of teamwork in the innovation process. In this context, we can say that the overriding attitude is Trust, which promotes the evolution of the role of Team Leader, but does not exclude the role of Controller. This combination of attitudes and roles constitutes a new approach to preparing employees for participation in the innovation process. It requires the appropriate preparation, both within hard and soft, of not arbitrary, but specific competencies in terms of Trust, Controller and Team Leader. It requires the ability to act as Controller while maintaining Trust, which keeps open the way to build a Team Leader position. The last component – *Creativity* – includes the skills and abilities of women to cope with risks. This component contains, as the most important skill Risk propensity, in which women's participation in the innovation process should be combined with Unconventional thinking and acting, and most importantly with Intuition. The attitudes contained in this component require a balance in their use by women in the innovation process. On the one hand an indicator of the area in which a kind woman moves when taking part in the innovation process is Risk propensity. In the context of this area there is a place

for women's Intuition, which on the one hand is a manifestation of unconventional thinking, and on the other hand can often indicate the need for unconventional acting.
Figure 3 (model 2) presents the values of each variable loading in the dedicated component. Based on the variables included in the components and their average loadings the components are: *Professionalism*, 0.686; *Values and attitudes*, 0.694; *Creativity*, 0.658 and *Roles of the team*, 0.656. The average component loadings allow the variation explanation in the original data to be preserved while reflecting the scale. The *Professionalism* component contains six variables with variance explanation ranked 0.537-0.805; *Values and attitudes* contains four variables with variance explanation ranked 0.476-0.931; *Creativity* contains three variables with loading accounted 0.541-0.885 and *Roles of the team* contains three variables with loading ranked 0.316-0.859.



Source: Author's work, with Amos use.

Figure 3 Men participation model in the innovation process

Table 2 represents the component correlation matrix for male participation in the innovation process of the companies under research.

Table 2 Component correlation matrix of men participation in the innovation process of companies.

Component	*Professionalism*	*Values and attitudes*	*Creativity*	*Roles of the team*
Professionalism	1.000	-	-	-
Values and attitudes	0.567	1.000	-	-
Creativity	0.531	0.481	1.000	-
Roles of the team	0.453	0.318	0.326	1.000
Extraction Method: Principal Component Analysis.				
Rotation Method: Promax with Kaiser Normalization.				

Source: Author's work, with SPSS use.

The Cronbach Alpha Test results show the reliability of the results obtained and support the interval consistency of the items justifying their use in a summated scale.
The Professionalism component includes hard and soft skills. For men they are the most important determinants of personal conditions in the innovation process. These competencies are tied to the performance of the role of team leader and the ability to focus on tasks. Acting as team leader is then combined with a high level of competence. The Values and attitudes component contains variables characterizing, beyond aspirations, attitudes towards other persons participating in the innovation process. In this component, the most important attitude is Focus on people, associated with Holistic approach and Trust of others. The Creativity component represents individual, independent thinking and behaviour of men in the innovation process. Unconventional way of thinking and acting linked with an appropriate level of Autonomy and Motivation using Intuition should be accompanied by the bold actions of men involved in the innovation process. Noteworthy is Motivation, which should be considered not only as a personal characteristic attitude of men, but as a feature of the environment in which individual initiative is adequately rewarded. The Roles of the team component contains three variables that can characterize the formal role of men in the innovation process. The most important of them is the Controller, and then it Negotiator and "idea sower". Noteworthy is the variable "Idea sower", which for many men is identified with a formal role.

5. Discussion

The conduct of research, management of the innovation process, commitment of tangible and intangible assets, including the methods of obtaining them, are among the areas of activity which often determine the competitive advantage of a company. Thus, a significant part contains information sensitive from the point of view of the development of a competitive advantage. They represent business secrets and are not eagerly communicated outside the

company, the more that the main objective of the research project was to identify areas that may be new, previously untapped sources of innovation, resulting from the different participation of women and men in the innovation process.

The application of PCA procedures allowed a set of variables to be identified separately for men and women participating in the innovation process of companies. Hence the list is also known of variables which through the application of PCA were not considered statistically significant descriptors of the participation of women and men in the innovation process in enterprises. For women a statistically significant set of 18 variables grouped into three components were identified, and for men 17 statistically significant variables grouped into four components were identified.

The study aimed to capture the essential characteristics, attitudes and behaviours common and different for men and women in the process of innovation taking place in enterprises. The applied PCA method enabled their indication. The models presented are an attempt to develop a holistic approach to such complex issues as gender participation in the innovation process. It should be noted that the process itself works differently in different companies. So it is not a completely repeatable phenomenon. On the contrary, despite common steps, characteristics and purposes, it contains a high level of uniqueness. Nevertheless, the systematic research in the direction and area begun here may bring a deeper understanding of the roles of men and women in the future, which in turn will make it possible to more accurately translate them to accelerate innovative development.

6. Conclusions

In the model of women's participation, the variables characterizing the attitudes external to colleagues, the formal and informal roles, and the coping skills of women in situations of higher risk, which is undoubtedly related to the process of innovation, predominate. Meanwhile, the model of the participation of men emphasizes in the first place competencies and the related acting as an informal team leader. This model also stresses the importance of unconventional thinking and behaviour, which is subject to an appropriate degree of autonomy and means of motivating this kind of activity. Finally, this model emphasizes the formal roles, among which Controller and Negotiator occupy a leading position. The main difference that arises on the basis of the models of participation obtained is taking and dealing with risks. In the female model this issue is of statistically significant importance, while in men it is almost absent. This is also confirmed by variables removed from the analysis, which in the case of men, variables such as Risk Propensity and Calculating Person do not constitute statistically significant traits, attitudes and behaviours in the innovation process. However, in both models, variables such as the Competition, Workload, Compilance to Rules and Regulations, Perceptiveness and Representative were considered to be statistically insignificant in the innovation process. These variables seem to confirm that the participation of women and men in one (the same) innovation process should not be based on Competition. This means indication of the need for cooperation in the context of the work performed. At the same time it is indicated that Compliance to Rules and Regulations does not play a significant role, which in turn is associated with the need to look for the best

solutions in the innovation process, which is significantly more likely to be associated with Unconventional Thinking and Acting than Compliance to Rules and Regulations.

The models presented unambiguously show that the participation of women and men is diverse and at the same time different. So, women bring significantly higher levels than men of Trust, Focus on People, Risk Propensity with Holistic Approach and Ability to Make Decisions to the process of innovation. Men, compared to women, bring in significantly greater levels of concentration on competence, Focus on Tasks and Unconventional way of Thinking and Acting. The ability to connect a sufficiently large range of Risk Propensity, Focus on People and Trust brought by women with the competences of Unconventional Way of Thinking and Acting brought by men in conditions of Cooperation and Trust – emphasized by both sexes – may be resources of faster development and obtaining synergies hitherto unused in the process of innovation.

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Annex 1 - Variables in the process of innovation:

Work environment	*Personal qualities*	*Abilities, skills and competences*	*Attitudes and values*	*Roles and behaviours*
Cooperation	Intuition	Ability for persuade	Focus on people	„Idea sower"
Competition	Perceptiveness	Ability to make decisions	Focus on tasks	Team leader
Motivation	Risk Propensity	Ability to learn	Calculating person	Negotiator
Workload	Unconventional way of thinking	Holistic approach	Aspirations	Controller
Autonomy	Compliance to rules	Ability to find financial sources	Trust	Representative

Source: Own elaboration.

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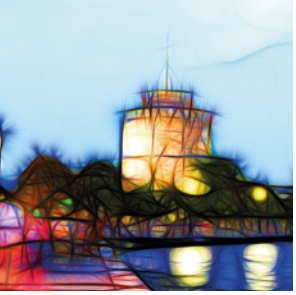

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STARMAC: AN ENVIRONMENT FOR THE STIMULATION AND THE DEVELOPMENT OF ENTREPRENEURIAL PROJECTS IN ACADEMIC INSTITUTIONS

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In this article, we present STarmac, a program developed by the Swiss Applied Science University of Canton Vaud (HEIG-VD), part of the University of Applied Science and Arts in Western Switzerland (HES-SO) to support young founders in the development innovative business ideas by providing them with the tools for management of market and technology risk. We present the STarmac program, its components and we outline a framework with some relevant metrics for its assessment and comparison with existing similar initiatives so that we can engage into a continuous improvement methodology and provide better support to our spin-offs teams.

Keywords
Entrepreneurship, Pre-Incubators, Startups, University Spin-offs

1. Introduction

STarmac is a university pre-incubator which is supposed to promote the emergence of entrepreneurial projects among the academic community by providing an environment that stimulates innovation and entrepreneurship from the ground up. STarmac is both a *physical place* where university students and staff can work and meet, and a set of *support services* organized into a "journey" towards the creation and development of new ventures. STarmac's main goals are the following:

1. It provides a safe environment where participants can win their fears and develop their business ideas by testing them on the market following the Lean Startup approach [1].
2. It fosters the creation of interdisciplinary teams with the right balance of technology and business development expertise.
3. It provides a liaison with the local entrepreneurial ecosystem as well as a due diligence process for potential investors for assessing the level of risk and the expected return of the investment.

When a founder or a founding team joins STarmac, an initial assessment is done to understand the stage of project's development. In most of the cases, projects are brought by engineering students or researchers. They might have developed the technology, but they have not considered elements of business development. There are sporadic cases of projects

brought by business students. It is our goal to increase the number of business students involved in entrepreneurship by proposing them classes where they can develop their own business ideas. We have identified 4 entry points for our program:

1. **Business Ideas**: based on founders' intuitions, business opportunities are proposed without any strong concern about technical feasibility or economic viability. Usually, ideas come from classes, but not always. Sometimes even first and second year students contact us to get feedback on their business ideas.
2. **Business Concept**: this phase represents the first step of validation of the idea. With a blend of training and coaching, founders engage with Market Discovery [1]. At the end of this phase, we expect that market opportunities are clearly identified. The program heavily relies on collecting primary data from potential clients. Teams need to perform at least 30 interviews during a term. Some projects stop at this stage because the initial assumption on the market demand where shown to be false. Moreover, some founders are not able to pivot and adapt their initial strategy to the outcomes of reality-check. As an additional outcome of this program, the founders have defined their initial (non-yet-validated) Business Model.
3. **Business Validation**: founders who have been capable to clearly identify a market opportunity, can now start to validate their Business Model assumptions. During another term (4 months), founding teams are pushed beyond their comfort zone and asked to tackle the market by selling their value proposition. Based on Steve Blank's Customer Validation method, founders will have to test their Minimum Viable Product (MVP) directly on the market. It is a fast pace process, where we ask the teams to rapidly iterate, emphasizing the "minimalism" of MVP, namely the minimum effort required for validating an assumption. Very often, MVPs are considered as prototypes or proofs-of-concept to show that the solution "works". We stress that MVP are tools for validation, and in their case, technical feasibility is rarely the riskiest assumption to validate first.
4. **Startup-Innogrant**: this phase involves both coaching and a financial support. During this phase, selected projects are incubated for 1 year to reach the necessary maturity to successfully apply for external incubation or acceleration programs. The main goal of this program is to prepare for scaling. There might be some assumptions left from the BV program and the team should be able to reach the necessary traction for becoming interesting for investors.

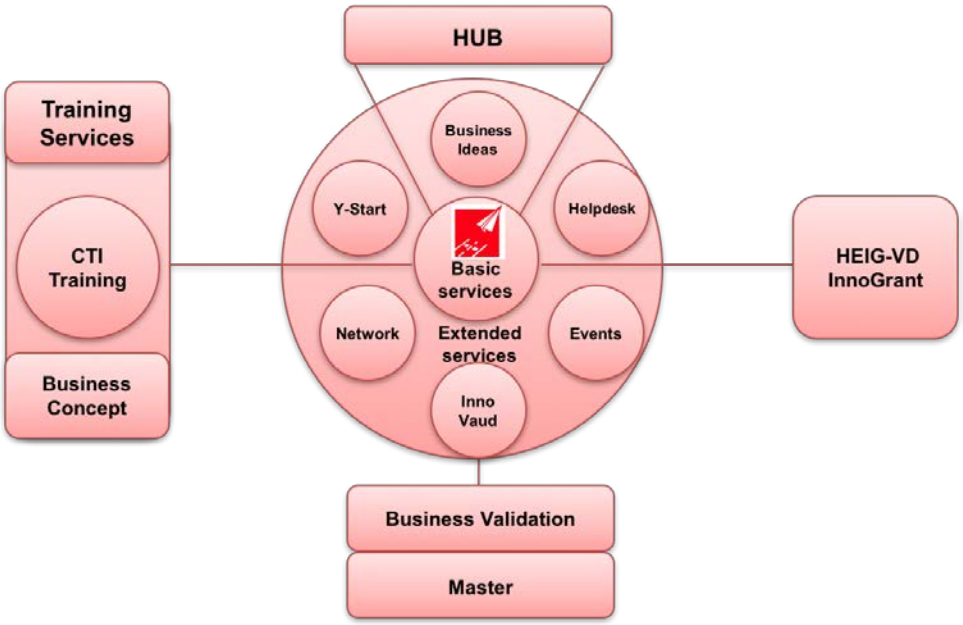

Figure 1 STarmac Architecture

As we previously said, STarmac also provide a suitable infrastructure for the emergence of entrepreneurial projects. The architecture of STarmac is shown in Figure 1. STarmac offers:

- An information and orientation Help Desk for entrepreneurship and innovation.
- A co-working space (HUB)
- A rich program of stimulation events and opportunities to liaise with the local entrepreneurial ecosystem.
- Individual coaching.

In this paper, we provide a framework for assessing the impact and performance of pre-incubators. We also present two studies we conducted that informed us in the design of this benchmarking framework.

2. State of the art

University spin-offs [2] are companies whose products are based on research carried out within their laboratories and institutes. Projects usually spawn from last-year student projects, PhD thesis and research performed by faculty and research staff. Spin-off development requires training and coaching because projects founders do not have all the necessary skills to build and run a business [3]. In some cases, the necessary training and coaching is guaranteed by the university itself. In other cases, it is provided by public or private institutions such as incubators and accelerators. According to the stage of development, this kind of support might take different forms. In most of cases, universities take care of technology transfer and delegate business development support to external institutions [4].

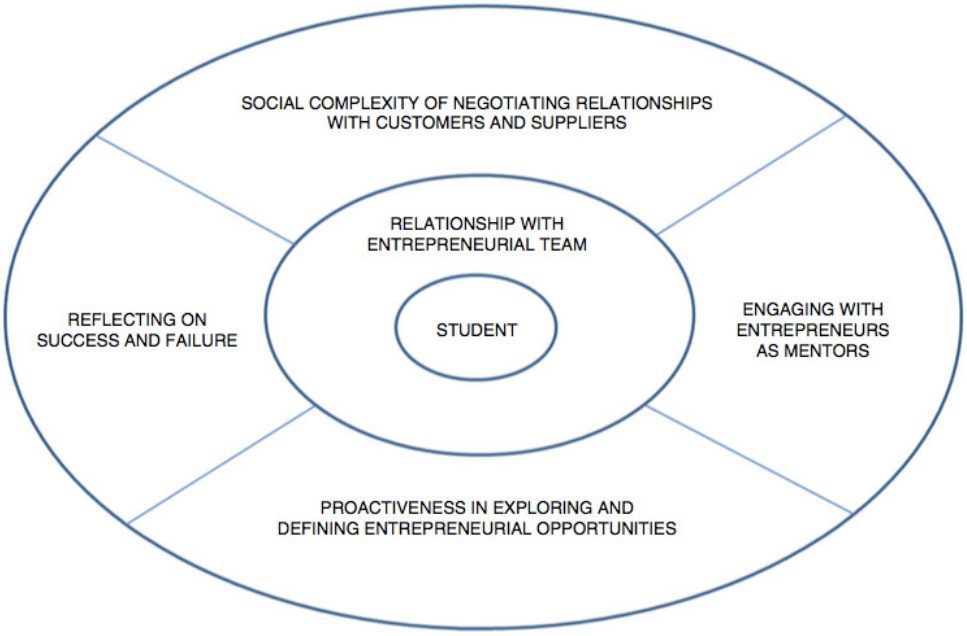

Figure 2 Conceptual Model of Key Success Factors for University Spin-offs from [3]

Supporting the creation of a business goes through different phases [5]:

1. Pre-incubation: idea generation, conceptualization, business model definition and validation, initial business plan.
2. Incubation: company incorporation, access to funding, setup of partnership, go-to-market strategy, growth.
3. Post-incubation: Scaling, industrialization, exit strategy.

In this paper, our focus is on pre-incubation of university spin-offs. We are interested in assessing the performance of pre-incubation by maximizing a set of indicators (metrics) that are relevant and that can help in benchmarking our efforts with respect to similar initiatives, the goal being deriving best-practices and continuous improvement our performance.

We adapted the methodology proposed by European Union for the benchmarking of business incubators [6] to the specific case of pre-incubators. As for retained indicators, we will base our set on the conceptual model proposed by [3] and shown in Figure 2. These indicators are related to the evaluation individual and team skills. We found an agreement with other similar initiative about the importance to develop such a skillset. Being an ongoing research, in this paper we only consider the metrics related to individuals and team skillset. However, our goal is to measure the full set of indicators, which include those related to economic impact.

3. Results

Today, STarmac hosts a dozen of projects and involves a core team of 5 people plus several adjunct and voluntary staff. In addition to the benchmarking with other initiatives, we compared the Key Success Factors (KSFs) for our university spin-offs that have not followed STarmac with those that did it. The results confirm the added value to health development of business for those projects that have been supported by STarmac.

STarmac is a newly created structure and we recently started collecting data. However, we already have some interesting promising results that we present in this paper. We provide here a resume of two studies: a qualitative one where we collected information about other local similar initiatives; a quantitative one where we assess the improvement of selected indicators when we provide support to founding teams.

3.1 Qualitative Study

The goal of the study we conducted was to confirm that our initial hypotheses and concerns were shared by other pre-incubators. We met with 4 directors of university pre-incubators in the French-speaking region of Switzerland. We can summarize the study with the following points:

1. Offered services are basically the same. No substantial difference in the types of offered services have been detected.
2. Market validation emerges as the most important skill to be learned. Other skills are: networking, flexibility, adaptation, win the fear of reality-check, interact with people, pitching.
3. Some recognize the role of pre-incubator to stimulate entrepreneurship and create awareness among students of different career opportunities and lifestyle.
4. The number of entrepreneurial student project is still too small.
5. There is a tendency in “sweetening” the support so to avoid scaring potential entrepreneurs. The pre-incubators do not work at full capacity.
6. Low interaction between pre-incubators. Because of low demand, there is a tendency to isolate teams that could be “stolen” by other pre-incubators.
7. Having teams at different stages of development in the same place is very helpful. More mature teams can advise newcomers and accelerate their development.
8. Pre-incubators performance is rarely measured. If it is the case, the most common metrics are qualitative and unclear such as “added value created”. There is rarely a link to economic development metrics such as “number of created jobs”. Metrics related to individual and team skillset development are also considered as important.

3.2 Quantitative Study

We performed a longitudinal study over 3 days of a “startup” student competition event co-organized by STarmac and other partner universities. We collected data 3 times during the event on sample of 90 people. Our initial hypothesis was that our selected indicators would

improve over time because of training and coaching. We asked 8 teams to answer 12 questions (on a scale ranging from 0 to 5). The questions can be categorized according to the Steffensen's conceptual model and they are shown in Table 1.

Table 1 Questions of survey categorized according to the Steffensen's model [3].

Relationship with entrepreneurial team	**Reflecting on Success and Failure**	**Pro-activeness in exploring and defining business opportunities**	**Engaging with entrepreneurs as mentors**	**Social complexity in negotiating relationships with customers and suppliers**
Do you think that interdisciplinary team brings some sort of competitive advantage? Do you feel that in the team a leader emerged?	Do you think that your product/service is innovative? Do you think you need to pivot? Do you feel that you are acquiring new skills related to the development of your business? Do you feel that you are focusing right on the jobs to be done?	Do you consider your business model validated? How are you comfortable with the viability (size, potential, accessibility) of the selected market segment(s)? How do you estimate the potential of your product to become global? (low – high)	Do you feel that coaching is done properly and you (and your team) are benefiting from it? Do you feel that your assumptions and beliefs are challenged and you are forced to leave your comfort zone?	Do you think you have discovered new knowledge about the sector/domain/industry for your product/service?

We can summarize the key results of the study as follows:

- The teams progressed in the business model validation.
- The teams lost confidence in the innovative power of their ideas.
- The confidence of their assessments of market size/type remained stable.
- The urgency of pivoting slightly increased over time.
- The participants felt they improved their knowledge of the market.
- While still high, their opinion about the importance of interdisciplinary team slightly decreased.
- They generally observed the emergence of a team leader.
- Their feeling of having acquired new skills increased.
- The awareness of impact of coaching increased only at the end of the process.
- The teams felt that they could keep focusing (stable high evaluation).
- The teams felt that they were increasingly pushed beyond their comfort zone.

4. Conclusions

In this paper, we have presented the STarmac pre-incubator with its essential components. We have also proposed a framework for assessing the impact of STarmac on five categories related to individual and team skillset. Preliminary result of our investigation about measuring the performance and impact of STarmac provide us with some useful insights that can inform the future development of the project.

As a next step, we are currently collecting data for the ongoing Business Concept and the Business Validation programs. Moreover, we are collecting qualitative data about the expectations of local economic development institutions. This will help us in setting up the extended benchmarking framework with related metrics.

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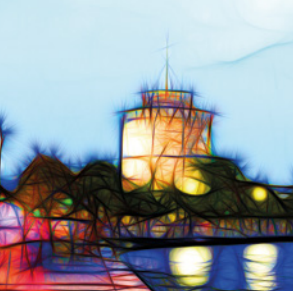

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METHODOLOGIES FOR SMART SPECIALISATION STRATEGIES: A VIEW ACROSS THE EU REGIONS

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Smart specialisation (S3) is a key idea, underpinning the EU Cohesion Policy framework in the field of innovation, constituting an ex-ante conditionality for EU Member States (MS) for receiving Structural Funds' support. S3 requirement fosters an in-depth analysis of the EU regional characteristics, focusing on helping MS to promote a transformation of their economic structure, through an 'entrepreneurial discovery process' (EDP). The emerging S3 concept, appears to have remained largely ill-understood by regional policy-makers [1], whereas various contributions and RIS3 evaluation reports have highlighted the difficulties in designing and implementing this strategic framework [2]-[5]. We argue that these difficulties can largely be attributed to the lack of clear methodological guidance, as well as to the inefficiency of adopting place-sensitive policy-support methodologies, capable to define key aspects of the RIS3 process, such as related variety, priority setting, intervention logic etc. We do this first, by mapping the methods that have been used for the design of RIS3 policies, and second, by comparing these with suggested methodologies, identified in an extended literature review, covering key aspects of the RIS3 process. The analysis reveals a significant discrepancy between the theoretical description of RIS3 methodologies and their practical implementation during RIS3 strategic planning, due to high level of technical complexity. This paper elaborates on the results of the ONLINE S3 project, funded under Horizon 2020.

Keywords

RIS3, Regional Development, Smart Specialisation

1. Introduction

Smart specialisation (S3) is a key idea underpinning the EC Cohesion Policy for the period 2014-2020 in the field of innovation and it constitutes an *ex-ante* conditionality for EU Member States (MS) for receiving Structural Funds support. S3 requirement fosters an in-depth analysis of the characteristics of each European region and MS to promote a transformation of the economy, through a process of 'self-discovery'. The S3 concept has emerged only recently and in the first years appears to have remained largely ill-understood by regional policy-makers [1].

More analytically, smart specialisation is being promoted as a place-based policy approach that foresees channelling of public and private investments in carefully selected priority areas, through an 'entrepreneurial discovery process' (EDP) that allows learning from both policy-makers and entrepreneurs" [6]. It concerns the prioritisation of investment based on an inclusive stakeholder engagement and attention to national and international market dynamics. In fact, the EDP can be used beyond the prioritisation process helping to fine-tune S3 priorities also during the implementation and monitoring phases [7].

Within the smart specialisation concept, policy decisions have to be based on knowledge that is very emergent and exist scattered across stakeholders. This calls for access to more real-time data gathering methods, as well as data visualisation tools that enable more user-friendly data analysis. Regional specificities are the starting point for EDP, hence it is of key importance that RIS3 design, implementation and monitoring employs custom-made policy intelligence that draws upon a wide array of data through web-enabled tools for more ambitious, accurate and timely analysis encouraging more experimentation and discoveries.

To date, various contributions and preliminary RIS3 evaluation reports have highlighted the difficulties in designing and implementing such a smart specialisation strategy [2],[3],[5],[8]. The initial European Commission's RIS3 planning documents provided little guidance to regional policy makers in the rather complex process of S3 design policy [3],[9]. Furthermore, even though entrepreneurs are in better place to identify opportunities, still, the bottom up process of EDP requires conscious moderation and careful guidance [3],[4],[10]. Both [3] and [11] explain different methodological ways to overcome the theoretical vagueness of the RIS3 guide in selecting priority sectors, while [10] discuss how technological relatedness can provide significant input to the EDP process. Finally, we recently see the offering of online tools through the JRC S3 platform offering the opportunity to scope the emerging landscape of specialisations and benchmark regions for improved cross-border learning.

Aligned with the above literature and activities, we argue that the observed difficulties in designing the regional and national RIS3 strategies [5],[8] can largely be attributed to the lack of a clear methodological guidance and to the inability to adopt place sensitive policy-support methodologies that define key aspects of the RIS3 process, such as related variety, priority setting, intervention logic etc. We do this first, by investigating the different methods that have been used during the design of the RIS3 policies and second, by comparing these with suggested methodologies identified in an extended literature review covering key aspects of the RIS3 process. The analysis reveals a significant discrepancy between the existing theoretical description of RIS3 methodologies and their practical implementation during RIS3 strategic planning, due to high level of technical complexity.

This paper is structured as follows: after the literature review presented in the introductory section, Section 2 presents the mapping exercise of applied methodologies in 30 European regional and national RIS3 strategies. Section 4 illustrates the main findings of an extended literature review on S3 good practices while, key conclusions are presented in Section 4.

2. Mapping regional strategies

In this section, we review the RIS3 design process of 30 European regions[1] (9 at national level and 21 at regional level). According to the Regional Innovation Scoreboard (RIS) 2016 classification [12], the selected sample of regions includes 6 Innovation Leaders, 9 Strong Innovators, 13 Moderate Innovators and 2 Modest Innovators, a distribution which broadly reflects the overall situation across European regions as mapped by RIS 2016.

During this exercise, we encountered several problems that made difficult to delineate between 'pure' RIS3 methods and the wider research and innovation policy intelligence gathering routines. First, there is a rather limited availability of documentary sources that could be used as a source of in-depth information, for understanding the ways in which the RIS3 design process was carried out in each region. Secondly, in many instances, it was impossible to detect how robust, deep and comprehensive the implementation of these methods had actually been in practice. Thirdly, many regions have undertaken analytical exercises independently from RIS3 process, as part of their general research and innovation policy framework, which made difficult to identify the used methodologies.

The mapping exercise revealed that regions did not follow the RIS3 steps [13] as a rulebook for the design of methodological approaches. In practice, analytical methods employed under Steps 2, 3 and 4 are highly intertwined making their separation somehow artificial. Overlapping methodologies throughout the S3 strategies include working groups/focus groups, stakeholder interviews, online surveys, benchmarking, peer-review, SWOT analysis, regional profiling and road mapping. The results also revealed that regions did not seem to apply all steps linearly, but rather use the RIS3 theoretical framework holistically. Overall, the robustness of methodological approaches varied and in many regions, even the key concepts of the various RIS3 steps were not fully understood.

The mapping results also point out that there is no real link between the level of innovativeness of a region and methodological sophistication of RIS3 design. Hence, it cannot be claimed that moderate and modest innovator regions generally use fewer and less rigorous methods, than leading innovation regions. In fact, it was surprising to see leading and strong innovation regions to have put little effort into their RIS3 strategic design, rather than accepting it as a serious basis for regional economic transformation. At the same time, regions with much more modest innovation performance and little experience in RDI strategy design seem to have undertaken comprehensive RIS3 exercises.

[1] **Leaders**: Bayern (DE), Niedersachsen (DE), Helsinki-Uusima (FI), Zuid-Holland (NL), East Sweden (SE), Stockholm (SE). **Strong**: Austria, Wallonia (BE), Aquitaine (FR), Midi-Pyrenees (FR), Ireland, Noord-Holland (NL), Northern Ireland (UK), Scotland (UK), Wales (UK), **Moderate**: Cyprus, Estonia, Central Macedonia (EL), Andalucia (ES), Hungary, Emilia-Romagna (IT), Puglia (IT), Latvia, Lithuania, Mazowieckie (PL), Centro (PT), Slovenia, Slovakia. **Modest**: Eastern Macedonia-Trace (EL), Warminsko-Mazurskie (PL).

According to Table 1, the main methodologies employed in each of the RIS3 steps are the following:

- *Step 1:* regional profiling, comprising key statistical analysis and qualitative assessment, SWOT analysis and working groups are the main methodologies used in this step, while various stakeholder consultation techniques are rather widespread.
- *Step 2:* stakeholder engagement and information dissemination methods are the key approaches used. Around one third of the mapped regions have also set up dedicated networking cluster platforms to drive/ support RIS3 governance. However, little is mentioned about the demand-side of the governance systems, especially in relation to enhancing and increasing transparency of the RIS3 process, as long as providing accountability to all regional stakeholders of the process itself.
- *Step 3:* most frequent methods used here are working groups and SWOT analysis, although this step has been largely integrated with other analytical steps.
- *Step 4:* most regions have used working groups/focus groups, while participatory deliberation and collaborative writing, as well as annotation opportunities have been exploited in some cases.
- *Step 5:* Apart from working groups, road mapping also emerges as a prevalent technique used in the design of policy mix, although it was hard to assess how sophisticated and thought-through the approaches of regions have been, in applying this method. Surprisingly, the charting of intervention logic is implemented only by less than 40% of regions. Given this fact, it seems that there is some lack of understanding regarding what steps are necessary throughout the context design of RIS3.
- *Step 6:* It appears that regions have struggled with the definition of structural change and context indicators, as the chosen approaches are simplistic, when compared to the complexity of monitoring requirements. Yet, it should be bear in mind that, in many cases details of monitoring frameworks remain only in the design phase, without being able to capture the progress of RIS3 implementation.

Table 1 Methodologies employed in each of the RIS3 steps.

Step 1: Analysis of regional/ national context	**Step 2: Governance**	**Step 3: Shared Vision**	**Step 4: Identification of priorities**	**Step 5: Policy mix**	**Step 6: Monitoring and evaluation**
Regional profiling (100%) SWOT analysis (87%) Working groups/focus groups (87%) Benchmarking (63%) Bibliometric analysis (57%) Stakeholder interviews (47%) Collaboration and networking analysis (37%) Online survey(s) (37%) Cluster analysis (27%) Value chain analysis (27%) Gap analysis (20%) Social network analysis (13%) Product space modelling (7%)	Working groups /focus groups (97%) Information events (73%) Information dissemination (60%) Expert and/or peer review of RIS3 process (50%) Online survey(s) (40%) Stakeholder interviews (40%) Set-up of dedicated networking/ cluster platforms (33%) Online forums/ discussion boards (27%) Communication through social media (17%)	Working groups/ focus groups (90%) SWOT analysis (60%) Statistical analysis (53%) Literature review (47%) Scenario building (40%) Stakeholder reviews (37%) Benchmarking (30%) Foresight (30%) Horizon scanning (27%) Road mapping (23%) Online survey(s) 20%) PEST analysis (13%) VRIO analysis (7%) Delphi survey(s) (3%) Risk assessment (3%)	Working groups/ focus groups (93%) Stakeholder reports (20%) Participatory deliberation/ collaborative writing annotation (17%) Ideas competition (7%) Web-based crowdsourcing (3%)	Working groups/ focus groups (83%) Road mapping (63%) Peer review (40%) Charting intervention logic of policy mix (30%) Ex-post evaluation of policy mix (30%) Benchmarking (30%) Stakeholder interviews (20%) Pilot projects to test effectiveness of policy mix (13%) Inventory survey (10%)	Definition of implementation, output and result indicators (90%) Definition of structural change and/or context indicators (70%) Various evaluations of RDI system components (60%) Peer-review (43%) Balanced scorecard (23%) Benchmarking (20%) Online survey(s) (13%) Research assessment exercise (13%) Best practice case studies (10%)

It should be noted that the highest variety of applied methodologies is observed in steps 1-*Analysis of Regional/National Context* and 3-*Shared Vision*, with large overlapping characteristics. Most of the regions used over 4 different methods to define their regional/national contexts. At the same time, step 4-*Identification of Priorities* is found to be the less developed step, as it illustrates a low methodological diversification, only 1 or 2 different methods have been used in each case. High level of complexity, characterizing methods that could be applied in this step, such as extroversion and related variety analysis, did not allowed policy-makers to go one step further and use them.

3. A review of good practices

There are several additional methodologies that could be used throughout a RIS3 strategic design process, apart from those identified in the mapping exercise. This section reviews analytical practices and state-of-the-art data application methods, for knowledge-based policy advice applied in RIS3 design, to provide a broader methodological landscape. This review will help identify gaps between what is currently used in RIS3 design, and potential methods that could be applied in the future, for expanding the effectiveness of a RIS3 design process.

Analysis of regional and national context

Literature review on good practices has indicated several emerging trends, regarding the analysis of the regional context. These include foresight exercises and diagnostic tools to identify new activities, possible synergies and complementarities that may arise within the regional context [14]. Profiling the regional assets and assessing the potential of emerging activities for specialisation, require the use of a variety of quantitative and qualitative data, regarding science and technology indicators, regional sectoral employment distribution, export indicators, road-mapping, SWOT analyses and foresight approaches. However, official statistical data has the disadvantage of being static and confined with the standard industrial and occupational codes (i.e. use of NACE codes), as well as being mostly geared towards past and present specialisations, without capturing the cross-sector and cross-technology dimension of emerging activities [14].
From a benchmarking perspective, advanced indicators, regarding mapping of science-technology nexus, citation analysis, and analysis of co-authorship and co-inventorship patterns, as well as relative indicators, such as the Activity Index (AI) for scientific activities, the Revealed Technological Advantage (RTA), and the Revealed Comparative Advantage (RCA) for economic activities [14], are essential for expanding its effectiveness. Also, affiliation and co-affiliation data from scientific publications can infer mobility patterns [15], while data from Thomson Reuters Web of Science (WoS) or Scopus can be used to conduct diachronic network analysis to identify mobility patterns among locations over time. Unstructured data can be used to identify emerging areas of technological and economic activity in a more accurate way [16], with their methods of analysis ranging from a simple search of keywords of interest, to complex unsupervised machine learning methods and text mining.

Governance: ensuring participation and ownership

Most of the focus on literature concerns the structures themselves, the ways in which they are designed and how they can facilitate the RIS3 process. The development of governance structures is very context specific and is expected to vary largely among regions. The use of community monitoring and community scorecards for giving feedback and increasing accountability to all regional stakeholders of the RIS3 process, could be largely beneficial for other steps of the RIS3 process, in particular for the RIS3 update. Opinion mining and sentiment analysis through the use of social media data and technologies can also support public engagement and provide decision support. Equally, the use of online participatory planning tools can enhance the active involvement of all stakeholders in the process.

Shared vision

Very little emerges from the literature regarding methods that regions are using to achieve a shared vision for the future of the region. Scenario building and foresight are the natural choices for building a shared vision for the future. Methods like participatory foresight are interesting ways

of involving all regional stakeholders in the construction of the RIS3 vision. Participatory foresight is demand-side driven, and is meant to directly involve beneficiaries and users of the RIS3, providing insight into the demand for societal challenges. It usually involves public consultation feed-in, steered with expert recommendations, which in many cases are facilitated through web-tools to carry the information flow. Within the foresight methods' family, the use of horizon scanning processes also helps decision-makers to take a longer-term strategic view and make present choices more resilient to future shocks and uncertainty [17].

The gap in this case, between the mapping exercise and the review on good practices, is likely to exist not because regions do not use any methods referring to these aspects, but because most of them involve participatory deliberation and consensus building, characteristics which are likely to be documented as parts of methods belonging to other phases of the RIS3 process.

Priority Setting

Participatory deliberation, in the form of focus groups, web-based public consultations, workshops and interviews with key stakeholders, is certainly the most common method used by regions for the identification of RIS3 priorities, as reflected in the mapping exercise. The choice of priority areas often happens based on broad participation of all relevant stakeholders within the regional ecosystem. However, this exercise could be enriched using crowdsourcing priority setting methods, offering flexibility to implement factual evidence in the RIS3 process. The overall objective is to assess the stakeholders' views and priorities. In general, this involves running a cross-sectional online public survey to understand the challenges faced by stakeholders and their views as to which areas of specialisation are of high priority to the region. Crowdsourcing is generally cost-effective, flexible and a fast way to establish a systematic dialogue between stakeholders, as well as to seek for feedback in relation to priority areas for policy intervention [18].

Another method might be the use of unstructured data to identify emerging areas of technological and economic activity in a more accurate and timely way [16]. Finally, the use of quantitative methods to inform the prioritisation process, as well as a better articulation of the use of data analysed and collected in step 1 of the RIS3 process is another identified gap.

Definition of coherent policy mix, roadmaps and action plans

As in the case of Step 3, very little emerges from literature as to what regions use as tools for the definition of a coherent policy mix, roadmaps and action plans. Most of what appears in the literature refers to qualitative exercises, based on participatory discussions with key stakeholders, including policy workshops and strategic regional partnerships that work as steering groups or expert groups for the development of action plans.

The development of online policy support tools has been explored recently for specific sectors. Tools for tracking data referring to projects and initiatives, that are publicly funded, are not widely used. Good practices regarding this issue, include the open data storehouse of Tekes in Finland, which allows to search for projects and beneficiaries having been funded through Tekes programmes[2]. UK follows similar approaches to open data: the Gateway to Research database[3] includes data referring to all publicly funded projects by Innovate UK and the Research Councils. Ongoing studies related to the use of open data regarding EU Structural Funds indicate that data being currently published by the EU national and regional authorities are in most cases not compatible, yet, with some of the fundamental requirements of the open data paradigm [19]. Data

[2] https://extranet.tekes.fi/ibi_apps/WFServlet?IBIF_ex=o_projekti_htm1&IBIAPP_app=openraho&YKIELI=E
[3] http://gtr.rcuk.ac.uk/

is rarely complete, accessible, timely, machine-processable and non-proprietary. Using open data on public support, would allow to track project themes and topics, as well as to see how they match with the overall S3 approach. This kind of data could be highly valuable not only for tracking progress towards objectives and visions, but also for informing the RIS3 update process.

Monitoring and evaluation

Finally, with respect to the last step, most of the examples cited in the literature concern the definition of a monitoring system for the RIS3, with different levels of complexity and technicality. Some of the most essential gaps in this case, concern policy intelligence, as long as lack of tools and methods reflecting the ways in which the monitoring process could be used in the revision of priorities and policy mix, with a view of a RIS3 update.

4. Conclusions and discussion

The mapping exercise performed during this study, revealed that regions did not follow exactly the RIS3 steps as set out in [7], for the design of their RIS3 strategies. The regional correspondents in charge of mapping, struggled to 'fit' the evidence on methods found to the theoretical RIS3 context. In practice, there were cases where methods employed under different steps were highly intertwined, making the steps' separation very artificial. The evidence also highlights a varying robustness of the methodological approaches, as well as the fact that key concepts of the RIS3 steps were not fully understood.

Literature review on good practices has revealed a series of interesting issues, focusing mostly on the need to promote evidence-based decision-making processes, regarding the development of RIS3 strategic planning. More specifically, a broader communication of the vision, the objectives and the results, as well as the use of new methods targeting to a more effective stakeholder engagement, could be considered as good practices for increasing transparency of the RIS3 process. Methods should able to promote a better understanding of the overall RIS3 framework, as well as available funding opportunities, to identify policy measures coherent with the regional vision and objectives.

A crucial step towards these improvements could be achieved using new datasets and sets of common indicators, advocating coherent computational and benchmarking analyses. Novel analytical concepts include: better understanding of the knowledge production and endowments, strengthening of scenario building practices and identification of emerging areas of technological and economic activities. Increased effectiveness, regarding the assessment and exchange of experience, related to the RIS3 implementation, could be also considered as an additional benefit of the promotion of an evidence-based decision-making process.

Starting from the *analysis of regional and national context*, emphasis should be given on a more effective and innovative use of the existing datasets, to achieve a comprehensive understanding of the regional assets and ecosystems, not only from a descriptive point of view, but also using a comparative analysis perspective. At the same time, *governance* should focus on the promotion of better stakeholder engagement techniques, that could enhance citizens' participation, as well as accountability, whereas expanding foresight methods' family, through horizon scanning exercises, could help policy-makers to extract longer-term strategic views, in the case of *shared vision*.

Steps 4-*Priority setting* and 5-*Policy mix & Action plan implementation* have been found as the most methodologically poor phases, throughout the mapping exercise. Their high degree of overlapping with other phases, as well as their highly demanding input data for analysis, constitute two of the main reasons for this. However, an essential number of good practices have been identified through the literature review, promoting a more effective identification of emerging areas of technological and economic activity, as well as identifying policy measures coherent to the regional RIS3 vision and objectives. Methods for defining and enhancing step 6–*Monitoring & Evaluation* focus on different levels of complexity and technicality. Given the fact that monitoring and evaluation are essential parts of the overall RIS3 design process, it is crucial for their outputs to be used as feedback for revising RIS3 priorities and policy mix, in cases where the desired results are far from being achieved.

Finally, it is important to notice that selected methods in each case, should be able to be backed up by novel instruments/tools, offering to policy-makers the opportunity to use them, regardless their level of complexity. Thus, the development of a set of potential tools that could be used in each case, could be considered as a further step of this research, in order to connect innovation and digital growth strategies [20].

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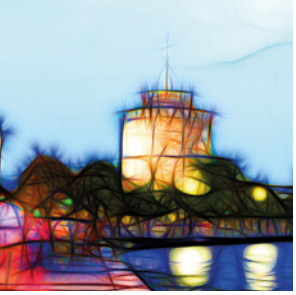

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CREATION OF MANAGEMENT STRATEGY OF A COMPANY WITH A FOCUS ON CONTEMPORARY TECHNOLOGY ACHIEVEMENTS AND INNOVATIONS

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Strategic management as a continuous process of creating a successful competitive strategies, among other factors should also focus on modern technological achievements and innovations. Enterprises should constantly monitor the environment, adapt to modernity and to build sustainable and competitive advantage in environments of its existence. This implies constant modernization of production, introduction of new and sophisticated technologies, innovation of products, services, and modernization of its overall process of action. In the context of the processed topic was completed and empirical research, which stated that the surveyed enterprises, the involvement of new technology and innovation management strategies to achieve competitive advantage improper is perceived by managers and employees. It shows the calculated value of x^2-test and coefficient of contingency, which the general conclusion is that companies do not pay enough attention to the introduction of new technology in the production process and innovation (promotion, improving) the existing product and introduction of new product. In labor, besides theoretical elaborations, the results of empirical research shows, accrual, tabular and graphic.

Keywords

Change, Competitive Advantage, Improvement, Investment, Research and Development

1. Introduction

In today's way of living and working, sustainable growth and development of each company depends on the application of new technologies and innovations in their work.
Technology as a set of theoretical and practical knowledge and skills has a strong contribution to the development of products and services, their creation, delivery and use. Technological changes are the driving factor of competition. Many companies today have been developed due to their skillful and timely usage of the benefits of technological changes.
Innovations and technology are undoubtedly one of the key factors of competitiveness at national and international business level. Competition, after all, has become imperative for the survival and prosperity of any company and any kind of business in all the countries in the world.
In this context, our empirical research has shown that the involvement of new technology and innovations in management strategies for achieving competitive advantage is inappropriately

perceived by a number of managers and employees included in the survey, according to their answers, calculated value of x^2-test and coefficient of contingency.
For this reason, special attention in this paper is paid to the interpretation of technology and innovations as most important impact factors for survival and development of a company and also to some outdated management strategies in some of the surveyed companies.

2. The impact of technology on growth and development of companies

Due to the turbulent movements and globalization, changes happen faster and faster. The technology has an unstoppable progress, making changes in the overall business activities and, thereby, in market competition. The markets become unstable, consumer demands are changing and the survival and development of companies could be jeopardized if new technology and inovations are not implemented. Proper business management, creation and use of technology innovation has emerged as an important and complicated task of any company. Technology is present in all spheres of society, in the field of material production just as in social activities. It consists of methods, means of work, manufacturing processes and materials, but it is also a social relationship and ability to organize and manage knowledge in order to provide its useful application. Technology is included in all operations that create new value, regardless of whether it is about a new product or service. Man, acting in society, develops technologies depending on his needs and aims. The uncertainty and unpredictability of the competitive environment requires understanding not only of the market environment in which companies compete, but also of the way things are expected to happen in the future.
Therefore, it is necessary to focus the attention on the competitive environment and market and how they are changing, i.e. to have an insight into everything that happens in the environment where the companies are operating.[1]
The focus on the external competitive environment is essential for understanding further development of the company. Every manager has ideas and beliefs about the future, because they are the basis for making decisions. If a company wants to keep up with the competition and to be even better, it needs to invest in its rise from the current position.

2.1 The impact of innovation on company's performance

Innovation is a system of organized and interrelated activities aimed at making changes (e.g. in the manufacturing or service operations, organizational structure, management etc.). Innovation is a new product, service, process or technology created by application of one's own or someone else's research work, discovery or knowledge, through personal concept, idea or method of its creation, which is placed on the market with a proportional value. "Innovation will create resources. There is no such thing in the world as "resource" as long as man has not found a use value of something in the nature and measure that something in economic value."[2]
In today's entrepreneurial economics, innovation is normal and continuous phenomenon.
Entrepreneurial activity is a process of assistance in which an individual or group of individuals make organized efforts to take advantage of favorable opportunities and create value, and to

[1] Langdon Morris, The innovation master plan: The CEO's guide to innovation, Chapter I-Why Innovate, 14
[2] Drucker Peter, Innovation and Entrepreneurship, Foreword by Christopher Bones, 2007, 56

spread these opportunities by fulfillment of tasks and requirements through innovation and uniqueness, regardless of the resources that the entrepreneur owns.[3]
Innovation is a key characteristic of entrepreneurship and factor of economic growth and development of enterprises and general economy of the country.
In this respect, the economic growth is a combination of five factors for innovation:[4]
1. New products
2. New production technologies
3. New markets
4. New resources and raw materials,
5. New organization of economic activities.

Paul Trott points out that innovation is a process of converting an idea into practical application, i.e. implementation[5], which can be expressed in the following relationship: Innovation = theoretical conception + technical invention + commercial exploitation.
The European Commission defines innovation as "renewal and enlargement of the range of products and services and the associated markets; establishment of new methods of production, supply and distribution; introduction of changes in management, work organization and working conditions of the workforce."[6]
The successful management of innovations should provide a flow of knowledge within the key functions of the company that lead to achieving the goal of the enterprise and increased competitiveness and profitability, i.e. realization of business success. Innovativeness of the organization consists of openness to changes, their effective managing and successful acceptance. Innovation is characteristic of a company that is willing to adopt new ideas and to respond quickly to the impulses from the environment. The innovativeness is a necessary condition for successful functioning toward the goal - long-term business success, i.e. profitability and competitiveness.
When it comes to innovation in the enterprise, there is a paradox: although companies are often motivated to develop new products (services or processes) in order to meet the needs of consumers, competitive factors and corporate goals, they often raise barriers and create difficulties that threaten the innovation process. The paradox in the development of new product comes as a result of the force that stimulates innovation and the force that creates resistance to changes.
Development of new product provides more benefits to the company, such as:[7]
- Competitive advantage;
- Positive change of the strategic direction;
- Return on investment and profit;
- Improved image;
- Strengthen marketing / brand;
- Attraction of good personnel;
- Development and growth of the company, etc.

Innovative organizations are characterized by positive changes achieved through creation of atmosphere of learning and improvement.

[3] Robins, Stephen P., Meri Kolter. Menadžment, 8. izdanje. Beograd, Data Status, 2005, 40
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Innovation is a way to achieve competitive advantage. Enterprises that gain competitive advantage in certain branch are usually the ones who not only perceive the new trends on the market or the potential of new technologies but rapidly take business actions to use them.

3. Empirical research

Empirical research was made to study the significance of new technology and innovation for the company in the domestic and foreign market. The questionnaires consisted of four questions and the answers were given by 34 managers and 111 employees. The survey was conducted from November to December 2016.
The basic hypothesis of our empirical research was the following: the company that creates management strategy with a focus on modern technologicy achievements and innovations will be more competitive on the market.

4. Results and discussion

The answers of the surveyed respondents (managers and employees) are grouped according to affiliation and then presented in tables and figures. Calculation of x2-test and coefficient of contingency was made for each question and the results of the questionnaire are presented in Table 1.

Table 1 Overview of data obtained in the study

Question	Offered responses	Individual responses			
		Managers		Employees	
		Value	%	Value	%
1. Does your company create a management strategy focusing on modern technology achievements and innovations??	**Yes** **No** **Don't know** **Total**	**29** **2** **3** **34**	**85** **6** **9** **100**	**63** **7** **41** **106**	**57** **6** **37** **100**
					X^2 = 28,086
2. Does your company develop new products, services or processes by investing in new technologies?	**Yes** **No** **Don't know** **Total**	**27** **1** **6** **34**	**79** **3** **18** **100**	**55** **11** **45** **106**	**50** **10** **41** **100**
					X^2 = 18,633
3. What kind of innovations are implemented in your company?	**Radical** **Incremental** **No answer** **Total**	**7** **25** **2** **34**	**21** **74** **6** **100**	**45** **47** **19** **111**	**41** **42** **17** **100**
					X^2 = 20,069
4. Do you believe that the implemented strategies were successful?	**Yes** **No** **Don't know** **Total**	**21** **7** **6** **34**	**61** **21** **18** **100**	**54** **9** **48** **111**	**49** **8** **43** **100**
					X^2 = 12,893

In our research, χ^2 test and contingency coefficient (C) were used in order to get the desired results. The χ^2 test, also known as Pearson's chi-squared test, is a sum of squared differences between the observed frequencies and the expected frequencies. It is calculated according to the following formula:[8]

$$\chi^2 = \sum \frac{(fo - f_e)^2}{f_e}$$

[8] Trajko Miceski "Health Statistics University "Goce Delcev", Ekonomski fakultet Stip, 2009, 190

where
χ^2 is the Chi-squared statistic,
O refers to the observed frequencies, and
E are the expected frequencies.
The χ^2 - test determines the relationship between the two variables, while the extent of this relationship can be estimated using the contingency coefficient (C), which is calculated as follows:

$$C = \sqrt{\frac{x^2}{N + x^2}}$$

Where

X^2 is calculated value of the x^2 test, and

N is total number of frequencies
Tabular and graphical presentation of the results is given for each question separately.

The first question was: *Does your company create a management strategy focusing on modern technology achievements and innovations*? The received answers are presented in Table 2 and Figure 1.
Three possible responses were offered: Yes, No and Don't know and the respondents were allowed to choose only one of them.

Table 2 Table of the responses of managers and employees to the first question

Question	Offered responses	Individual responses			
		Managers		Employees	
		Value	%	Value	%
Does your company create a management strategy focusing on modern technology achievements and innovations??	**Yes**	**29**	**85**	**63**	**57**
	No	**2**	**6**	**7**	**6**
	Don't know	**3**	**9**	**41**	**37**
	Total	**34**	**100**	**106**	**100**
X^2 = 28,086					

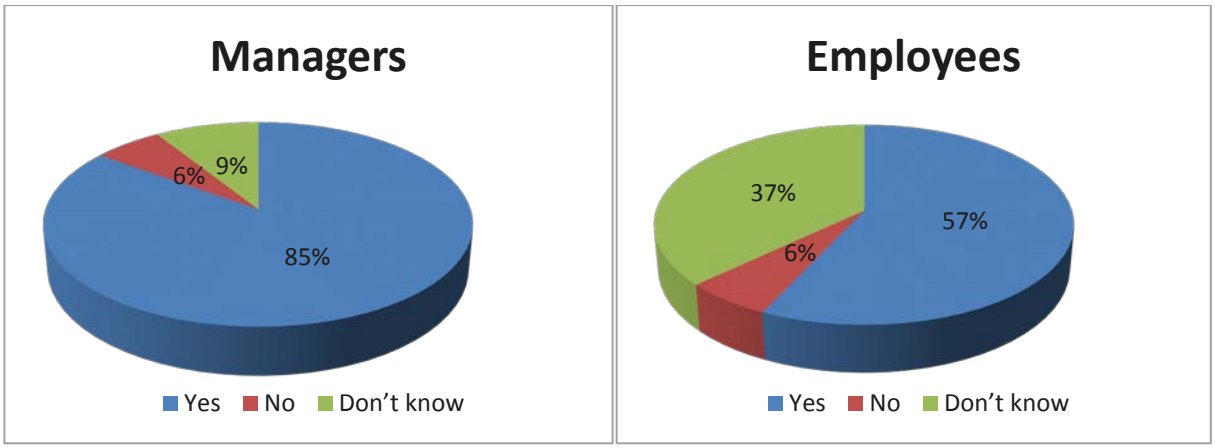

Figure 1 Does your company create a management strategy focusing on modern technology achievements and innovations?

By processing the data for the two groups of participants and the calculated x^2-test and contingency coefficient, the following results were obtained:
χ^2 0,05 (calculated value) = 28,086> x^2 0,05 (calculated value) = 5,991
C = 0,351
The calculated value of χ^2 test (28.086) is higher than the tabulated value of 5,99, showing differencies in the responses of managers and employees, although the two groups of participants gave 50% positive responses, which is more vivid among managers.
The value of the coefficient of contingency is 0.35, indicating that the intensity of relationship between the responses of managers and employees is very weak. This implies that the general hypothesis is incompletely fulfilled, due perhaps to the lack of information among the employees, lack of commitment to the development of new technology, weak implementation of radical innovations etc.
The second question was: *Does your company develop new products, services or processes by investing in new technologies?*
The responses received to this question are presented in Table 3 and Figure 2.

Table 3 Responses of managers and employees to the second question

Question	Offered responses	Individual responses			
		Managers		Employees	
		Value	%	Value	%
Does your company develop new products, services or processes by investing in new technologies?	Yes	27	79	55	50
	No	1	3	11	10
	Don't know	6	18	45	41
	Total	34	100	106	100
				X^2 = 18,633	

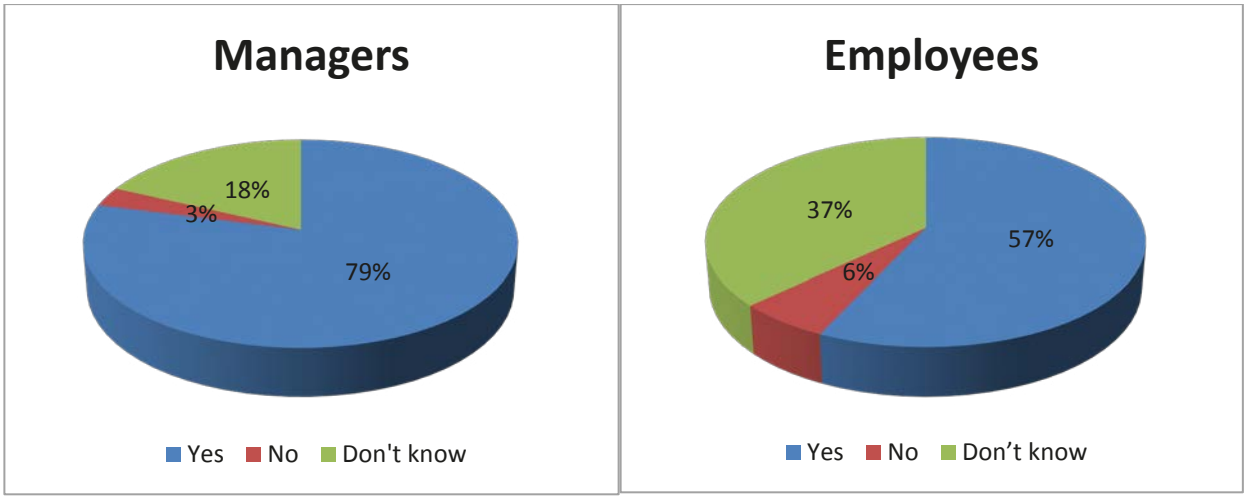

Figure 2 Does your company develop new products, services or processes by investing in new technologies?

After calculations of χ^2 test and contingency coefficient, the following values were obtained: $\chi 2$ 0,05 (calculated value) = 18,633> x^2 0,05 (calculated value) = 5,991

C = 0,292

The calculated values presented in Table 3 and Fig. 2 shows that the responses given by surveyed managers and employees are not identical. It can be concluded that there is still insufficient investment in new technologies and introduction of new products, services and productional processes, although the statements of managers are more optimistic. With regard to this question, too, the general hypothesis is incompletely fulfilled and the surveyed companies must pay higher attention to investments in new technologies and development of new products.

The third question was: What kind innovations are implemented in your company? The responses to this question are presented in Table 4 and Figure 3.

Three possible answers were offered for each question: Radical innovation, Incremental innovation and No answer. Respondents were allowed to choose only one of the answers.

Table 4 Responses of managers and employees to the third question

Question	Offered responses	Individual responses			
		Managers		Employees	
		Value	%	Value	%
What kind of innovations are implemented in your company?	Radical	7	21	45	41
	Incremental	25	73	47	42
	No answer	2	6	19	17
	Total	34	100	111	100
		$X^2 = 20,069$			

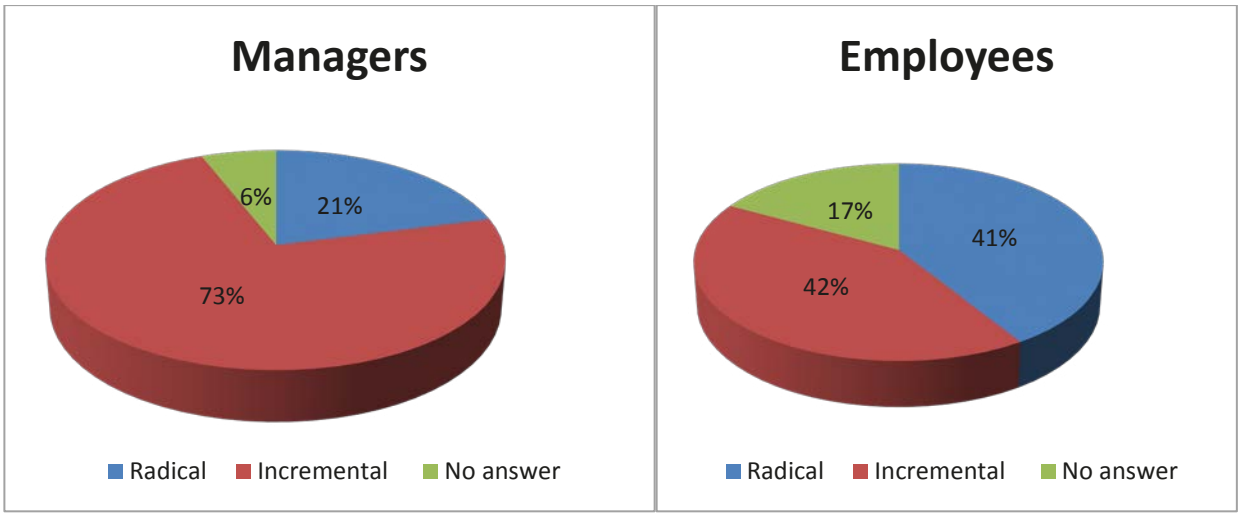

Figure 3 What kind of innovations are implemented in your company?

After processing the answers of the two groups of respondents, the following data were received:
X^2 0,05 (calculated value) = 20,069> x^2 0,05 (calculated value) = 5,991

C = 0,302

The calculated value of x^2-test (20.069) is higher than the tabulated value of 5,991. The responses of managers and employees differed, although both groups of respondents in the surveyed enterprises answered that incremental innovation is predominant. The contingency coefficient was also low, with a value of only 0.302.
It can be stated again that the general hypothesis is incompletely fulfilled and there is no sufficient implementation of radical innovations.
The fourth question was: Do you believe that the strategies implemented so far were successful?

The results of the responses received to this question are displayed in Table 5 and Figure 4.

Table 5 Table of the responses of managers and employees of the fourth question

Question	Offered responses	Individual responses			
		Managers		Employees	
		Value	%	Value	%
Do you believe that the implemented strategies were successful?	Yes	21	61	54	49
	No	7	21	9	8
	Don't know	6	18	48	43
	Total	34	100	111	100
X^2 = 17,383					

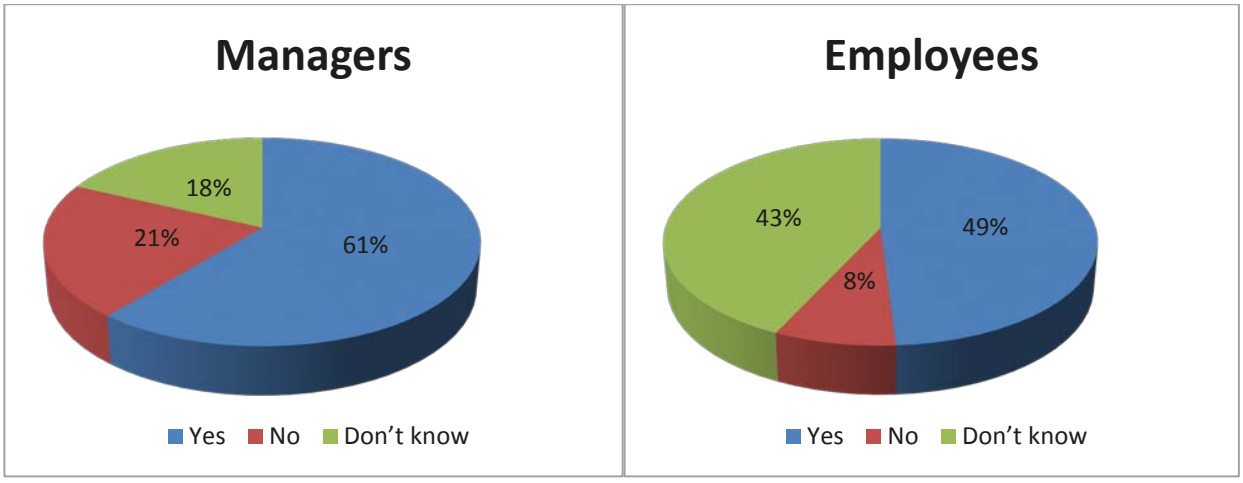

Figure 4 Do you believe that the strategies implemented so far were successful?

After calculations of χ^2 test and contingency coefficient, the following values were obtained:
$\chi 2$ 0,05 (calculated value) = 17,383> x^2 0,05 (calculated value) = 5,991
C = 0,283
Data and calculated values presented above show that managers and employees differ in their average response to this survey. More optimistic responses were received by the managers, probably to show the respect for their work in the company.
From the summarized results of the empirical research it can be stated that the surveyed companies are not excelled in development of technology innovations and, due perhaps to their small resource allocations in research and development.

5. Conclusion

To realize their competitive advantage, the companies must pay attention to the process of formulation of a good management strategy, focusing on the application of modern technology achievements and innovations.
The task of strategic management is constantly to adapt the company to a variable environment. Environment has a permanent impact on companies and, likewise, companies must perform activities that impact their surrounding environment. This implies permanent modernization of production, introduction of sophisticated technologies and innovation of products, services and production process in each company.
The goal of each company is through management strategy which involves application and production of new technologies and innovations in the production process or services to improve the competitive positioning of the company in domestic and international market.
The empirical research shows that the surveyed companies make insufficient investments in introduction and purchase of new technologies and rarely decide to abandon their product and introduce a new one.
To achieve higher technology and innovation achievements, the companies should allocate more funds from their budget for development departments, especially for scientific research.
Theoretical and empirical research show that in today's competitive and turbulent environment, continuous monitoring of the situation is indispensable, along with continuous improvement of management strategies through research and development, listening to the ideas of the employees and their involvement in the process of innovation, investment in new technologies, following the latest trends and introducing new products, services and processes.

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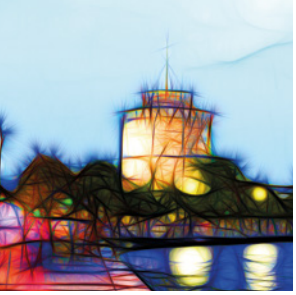

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MONITORING THE IMPACT OF SMART SPECIALISATION STRATEGIES ACROSS EU REGIONS

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The European Union's (EU) directions for Regional Smart Specialisation Strategy (RIS3) development call for the design and integration of a monitoring and evaluation mechanism for allowing a better control and periodic refinement of the strategy. In line with this requirement, the purpose of this paper is to present a Monitoring platform that was created in the context of the project 'Smart Specialization', funded through the 2007 – 2013 Interreg Greece-Bulgaria programme, with the purpose of monitoring the impact of RIS3 across EU regions. The platform, called 'M3' after the 'Measure, Monitor, Mobilise' approach, is a Strategic Decision Support platform, which includes (i) a measuring and monitoring module, (ii) an administration module, (iii) a data repository and (iv) a reporting module that integrates online comments by experts. M3 includes predefined templates for RIS3-specific text and monitoring indicators, whereby the policy maker is required to enter free text and numerical data. Afterwards, a monitoring report is generated automatically. This report can be stored and updated periodically. We also describe a use case of M3 in the Region of Kentriki Makedonia, Greece.

Keywords

Digital Platform, Monitoring and Evaluation, Regional Development, Regional Innovation Policy, Region of Kentriki Makedonia

1. Introduction

National, regional and local policy making authorities nowadays are increasingly pressured to design and implement successful policies tackle complex and interconnected socioeconomic challenges. Such complex challenges are often characterized by uncertainty and ambiguity and require the existence of transdisciplinary knowledge and transparency, as *"there is a plurality of values and opinions"* which often lead *"to strong disagreements within society and power games between various interest groups"* [1]. Moreover, policy makers are striving to create and implement adaptive, fair, and transparent policies [2]. In this demanding and quickly changing environment, policy makers have to become proactive, knowledge based and user driven by building their

internal capacity to quickly process background information and draw on new and alternative forms of knowledge generated by their stakeholder communities.
Urged by these recent developments, smart specialisation is a new innovation policy concept designed with the purpose of promoting a more precise and informed targeting of public investment into Research and Development (R&D) areas. The primary purpose of smart specialisation is to boost regional innovation in order to achieve economic growth and prosperity, by enabling regions to channel their efforts towards a specific number of policy areas that present increased potential for success. In order to achieve this, Smart Specialisation Strategies (S3) need to build on existing strengths, account for regional competition, and capitalise on the potential of partnerships among businesses, public entities and knowledge institutions [3]. In line with this new way of thinking about innovation, the existence of a regional Smart Specialisation Strategy (RIS3) has been adopted as an 'ex-ante conditionality' for all European Union (EU) regions for the use of European Structural and Investment Funds (ESIF) for the 2014-2020 programming period. To support the uptake of the new policy, the European Commission (EC) released in 2012 the '*Guide to Research and Innovation Strategies for Smart Specialisation'* [4], which describes the concept of smart specialization and puts forward the methodological framework for the design and implementation of RIS3. This methodological framework includes six steps that guide the RIS3 design and implementation process[1].
In line with the above developments, the purpose of this paper is to present a methodology and tool that was created for monitoring the impact of S3 across EU regions, appropriate to 'Step 6: Integration of monitoring and evaluation mechanisms'. This methodology and tool are offered through the 'M3' RIS3 Monitoring platform [5], which was developed by the research lab Urban and regional Innovation Research (URENIO) of the Aristotle University of Thessaloniki, in the context of the project 'Smart Specialization', funded through the 2007 – 2013 Interreg Greece-Bulgaria programme.
The next section (2) elaborates the concept and significance of monitoring and evaluation in the RIS3 context. It also presents the types of indicators used in RIS3 monitoring. Section 3 presents the M3 platform, and more specifically the design process, the platform modules, how the platform can be accessed and used, and a pilot use case on the region of Kentriki Makedonia, Greece. The last and final section of the paper discusses the work undertaken so far and prompts for further work areas.

2. Monitoring and Evaluation in the RIS3 Context

2.1 Concept, significance and characteristics

The monitoring and evaluation (M&E) system is considered to be an important part of the overall governance system, along with budgeting, human resources management and

[1] These steps are: Step 1: Analysis of the regional context and potential for innovation, Step 2: Set up of a sound and inclusive governance structure, Step 3: Production of a shared vision about the future of the region, Step 4: Selection of a limited number of priorities for regional development, Step 5: Establishment of suitable policy mixes, Step 6: Integration of monitoring and evaluation mechanisms.

systems' auditing [6]. Its main contribution is to provide an analytical feedback system regarding the outcomes, impacts and effects of the implemented policies and programmes. According to Raimondo [7] there are two key mechanisms through which M&E can affect the effectiveness of implemented projects. First, M&E provides crucial evidence with respect to the degree to which each project achieves its goals and its results compared to the target values. Secondly, there is evidence in the literature that M&E can positively affect the overall quality of project supervision and implementation, resulting to higher quality outputs [8].

That said, *'Monitoring and Evaluation'* is the final and conclusive step (Step 6) of S3, based on the RIS3 Guide developed by Foray, Goddard [4]. It refers to the requirement to closely *monitor* the progress of the implementation of the strategy, while *evaluation* refers to the assessment of whether and to what extent RIS3 strategic objectives are met [9]. A recent definition of monitoring is given by Gianelle and Kleibrink [10], stating that monitoring usually encompasses all sorts of activities that have to do with the collection and processing of information regarding the achievement of expected results and the degree of implementation of policy measures. The monitoring framework is established right from the outset of the RIS3 strategy, determining how and when the different components of the strategy will be audited for their progress. Given the fact that this step greatly influences the tone upon which the pursuit towards smart specialization unfolds thorough the process, it is a crucial part of RIS3, which essentially determines how the success of the strategy will be measured.

Considering that RIS3 are not regarded as static constructs, but rather as continuously evolving and adjusting to new developments and evidence with regards to economic and framework conditions, RIS3 M&E should be addressed as a continuous and iterative process [9]. Given that monitoring can be regarded as an information gathering mechanism, one of its main utilities is to constitute a base upon which a periodic refinement and refocusing could be made. Three main purposes referring to the utility of RIS3 monitoring mechanism should be highlighted here [11]. First, learning-and-acting is one of the core purposes of the monitoring process, indicating the need for policy makers to be well informed about the reality conditions and the risks of failing, as well as the development of a learning system for participants. Second, trust-building amongst stakeholders and citizens is another important dimension of monitoring processes. This characteristic should be accompanied by motivation, commitment and aversion to report failure. Last but not least, accountability is considered to be an integral part of this mechanism, built on clear rules for counting/measuring and bottom layer auditing. Given the fact that monitoring can be regarded as an information gathering mechanism, one of its main utilities is to constitute a base upon which a periodic refinement and refocusing could be made. According to Nauwelaers and Wintjes [12] the evaluation process should also play a key role to understanding the ways in which complex innovation policy systems operate. Although evaluation systems have traditionally been considered to have an ex post character, there is evidence that they can also be used for improving the design of innovation policies in real time [13].

In a RIS3 context, advancing from the phase of vision statement and objectives' setting to the selection of envisaged solutions used to achieve these strategic objectives denotes the transition from the general to the more specific and actions driven part of the planning

procedure. During this latter phase, the selection of the "means" that will be used to achieve the desirable "ends" (goals) referring to specific socio-economic areas will ultimately define the set of priorities that will be determined. Having chosen a specific set of priorities it is then possible to define explicit variables and indicators, which could be used to measure the expected change made by the selected levers on the targeted socio-economic areas of intervention. More specifically, according to Gianelle and Kleibrink [10], expected change is defined by: (i) a variable of socio-economic nature; (ii) a set of baseline and target values; and (iii) a timeframe for variable observation. The identification process of the expected change measures therefore sets the foundation of the M&E systems. As a result, it becomes evident that the design for a well-organised and effective M&E mechanism is considered to be an integral part of the whole strategic RIS3 planning process.

2.2 Types of indicators used in RIS3 monitoring

The fact that RIS3 strategic planning has turned out to be a fundamental ingredient of policy making within the EU indicates the need to adjust M&E mechanisms accordingly, and thus specify appropriate monitoring indicators under this framework. Three types of monitoring indicators are defined on the basis of the RIS3 Guide [4]: '*(i)* ***Context indicators,*** *scoring the region against the average score of its Member State or other similar regions. These indicators are usually attached to the overall objectives of the strategy, (ii)* ***Result indicators,*** *selected for each component of the strategy contributing to the overall strategic goals, e.g. important actions funded by the Structural Funds. These indicators allow verifying whether these actions are successful or not, i.e. whether they lead to the expected change for which purpose they were designed and (iii)* ***Output indicators,*** *measuring the progress of the actions undertaken in order to achieve the expected results'.*
It would be interesting, however, to explore the concepts of result and output indicators in more depth, accounting for the EU policy making context[2]. Result and output indicators are the main instruments of the M&E processes, and try to capture the effectiveness of the implemented programmes' performance. *Result* indicators are the expression of the objective of an investment priority [14]. They correspond to the specific objectives set out for each investment priority selected. Result indicators go beyond output indicators in so far as they capture a change in the situation, in most cases related to supported entities or participants [15]. *Output* indicators, on the other hand, should be programme specific and be derived from the intervention logic, (i.e. the actions implemented) of the programme [16]. An output is considered what is directly produced/supplied through the implementation of a structural funds operation, measured in physical or monetary units. Outputs are measured at the level of supported people, supported entities, provided goods or services delivered. They are set at the level of investment priorities or specific objective [15]. This is a crucial difference between the two kinds of indicators, as it implies that for

[2] Context indicators were not used because they are usually attached to the overall objectives of the strategy.

the case of output indicators, there is no need for setting baseline values. This means that the baseline in these cases is zero [16].
In all cases, indicators should be: i) responsive to policy; ii) normative; iii) robust; and iv) they should be available to be collected or calculated over time. For each of them a baseline value should also be required, in order to make comparisons and evaluations of the implemented policies.
A recent mapping exercise which took place in the context of the EU-Horizon2020 Research Project ONLINE-S3[3] reviewed 30 RIS3 strategies across the EU and found that a definition of output and results indicators process has been applied in 27 out of the total 30. This means that M&E systems are not only seen as pivotal instruments in RIS3, but they are also widely used in existing strategies.

3. A System and Platform to Support RIS3 Monitoring and Evaluation

The M3 platform [5] provides the necessary recourses (tool, documentation) that support the M&E exercise of RIS3 (step 6 according to RIS3 Guide by Foray, Goddard [4]). It was developed in the context of the European Territorial Cooperation Programme Greece-Bulgaria 2007-2013 *'Smart Specialization'* and it is addressed to policy makers and experts that conduct these types of analyses in the context of RIS3 development and implementation. The aim of the project *Smart Specialization* was to assist all eligible regions in developing, administrating and implementing their priority policy of RIS3 for the programming period 2014 – 2020. The name of the platform, M3, derives from the '*Measure, Monitor, Mobilise*' sequential conception, implying that policy makers can use this platform to measure outcomes of RIS3, monitor progress towards envisaged targets and mobilise stakeholders into collaborating towards RIS3 objectives.

3.1 Design Process

Three distinct asks guided the development of the M3 platform:

- The first task, entitled *'Comparative analysis of monitoring and measuring systems'* aimed to identify and compare currently existing monitoring and measuring platforms upon different predefined levels (platform aim/function/characteristics, results yielded, value added). Overall, 45 proprietary and open-source platforms were identified and assessed in terms of their functionality, characteristics and added value in the RIS3 framework. This task allowed the identification of the best and most suitable components for the M3 platform, enabling the development of a system that is close to RIS3-specific needs and satisfies user preferences in this respect.
- For the second task, entitled *'Web measuring system design',* the M3 system functions and the system inputs and outputs were defined. On the basis of the previous, a

[3] http://www.onlines3.eu/

system operation flowchart was designed and the system requirements were set. The final step of this task was to design mock ups of screen layouts.

- During the third task, entitled *'Web measuring system development (M3 platform)',* we developed the project's M3 platform, tested it (Alpha testing, Beta testing) and launched it to the project partners.

3.2 M3 platform rationale. Accessing and using the platform.

The RIS3 Monitoring platform called M3 is a **Strategic Decision Support platform**. The logical steps for the usage of the platform are:

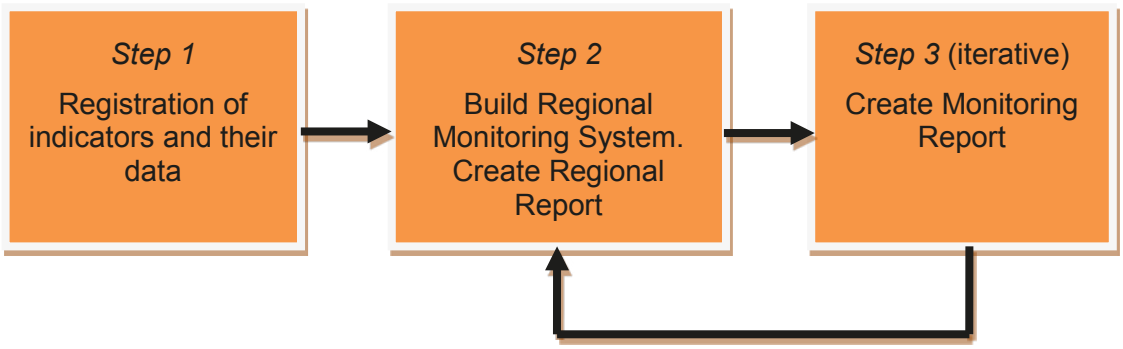

Diagram 1. Logical steps for the usage of the M3 platform

The creation of a regional report reflecting the status of the regional innovation system in a region in any given time (step 2) is followed by the creation of a monitoring report which allows the policy maker to monitor the progress of RIS3 towards the fulfilment of its goals (step 3). The loop in Diagram 1 denotes that this process is iterative, in that new regional reports are created at later stages of RIS3 will in turn allow for the creation of new monitoring reports.
The M3 Platform is accessible through the URL: http://www.urenio.org/bwap_m3/. To acquire access to the platform, the prospective user is urged to contact URENIO Research through this same URL in order to acquire a username and password, which they will be able to use in order to access the platform.

3.3 Platform modules

M3 supports the collection and visualisation of data as a bridge to the programming period 2014-2020 in the form of outputs and results indicators. It is a web based monitoring system implemented upon WordPress CMS. It includes the following subsystems:

- **Measuring and monitoring module**. This module aims at the establishment of the RIS3 measurement framework and the included monitoring indicators. The two types of indicators used, result and output, comply with the RIS3 Guide [4] as analytically presented in section 2.2. The selected output indicators measure the progress

undertaken in order to achieve the expected results and selected through the system of common indicators set by regulations of the Structural Funds. These common indicators are defined in the '*Guidance document on monitoring and evaluation*' for the programming period 2014-2020 released by the European Commission [14]. The selected result indicators measure the changes made to the intervention area and due to the impact of funded activities. A template that the user is required to fill in as per each indicator is used –this template includes information about the year, value of the indicator, country and region of reference, the indicator's baseline and target value. It is possible for the user to incorporate new indicators to this database, depending on rising needs. For the development of M3, result and output indicators are defined on an RIS3-related Investment Priority basis. More particularly, for each Investment Priority we identified the most suitable output indicators (ranging from 2 to 8 indicators) and result indicators (ranging from 2 to 9 indicators). Overall, in this exercise we defined and included 40 indicators in a variety of combinations under each Investment Priority. An example of selected indicators for Investment Priority 1a is provided in the Annex of this paper.

- **Administration module.** This module, depending on the users' account privileges, serves the following four functions: *i) Manage regional reports*: add / modify / delete measuring reports for each region. The reports have a predefined structure and different indicators and charts can be incorporated in the reports, ii) *Manage indicators:* add / modify / delete indicators. All the indicators have predefined template that require data input. The indicators are linked to the programme activities, iii) *Manage monitoring reports:* The relationship between the outputs, results and investment priorities is the monitoring system for each region, *iv) Manage users:* Each user can modify their profile. The administrator of the platform can define for each user their privileges such as for which region they can produce monitoring reports.
- **Data repository.** Each WordPress installation has 11 default tables in the database. Each database table contains data for different sections, features, and functionality of WordPress.
- **Reporting module that integrates online comments by experts.** The reports have a predefined structure and different indicators and charts can be incorporated in the reports. Each region might follow the proposed template or modify it according to its RIS3 requirements. The proposed sections of the monitoring report are based upon the investment priorities related to RIS3:

Table 1 Predefined structure of RIS3 report on M3 platform

Structure of the RIS3 report	S1: INTRODUCTION
	S2: INVESTMENT PRIORITY 1a: Strengthening research and innovation infrastructures
	S3: INVESTMENT PRIORITY 1b: Promoting business investment in R&D
	S4: INVESTMENT PRIORITY 2a: Extension of the development of broadband services and networks
	S5: INVESTMENT PRIORITY 2b: Development of ICT Product and services
	S6: INVESTMENT PRIORITY 3a: Promotion of entrepreneurship by exploiting new ideas
	S7: INVESTMENT PRIORITY 3c: Creation of advanced skills to develop products and services
	S8: INVESTMENT PRIORITY 3d: Support capacity of SMEs to engage in innovation processes
	APPENDIX

For each of the above sections (i.e. per investment priority) the user is called to enter information and text in the following areas:

- Objectives of the priority
- Baseline situation in the region
- Actions implemented in the of field of the Investment Priority
- Policy instruments used
- Indicators: Tables and Diagrams
- Impact analysis
- Conclusions

In sequence, the user is urged to create a RIS3 monitoring report, which includes:

- a description about the monitoring system of each region
- a chart that is produced automatically displaying the relation of outputs and results indicators per investment priority and
- a table with all output and results indicators

3.4 A use case in the region of Kentriki Makedonia, Greece

In the context of the 'Smart Specialization' programme, template reports were created on the M3 platform for the regions of Kentriki Makedonia (EL), Anatoliki Makedonia and Thraki (EL), Yugozapaden (BU), Yuzhen tsentralen (BU). Here we will briefly describe the use case of the region of Kentriki Makedonia.

The first report for the region of Kentriki Makedonia is one of the outcomes of the monitoring system conducted by experts and supported by data analysed and visualised by the M3 Platform. The report aims to show the progress of the implementation of the region's S3 and is structured around the investment priorities that are related to the RIS3

of Kentriki Makedonia. For each Investment Priority, and upon the predefined template of sections mentioned in section 3.3 of this paper, a series of information and data are laid out. For example, for Investment Priority 1a: Strengthening research and innovation infrastructures:

- the basic *target* is to increase overall expenditure on R&D from 0,68% in 2011 to 1% of regional GDP in 2020 with doubling the part of the business sector. Specific *objectives* are to (i) Strengthen the research units to promote applied research in areas of regional interest set by the RIS3, (ii) Strengthen regional research structures and infrastructures, (iii) Exploit research potential to the benefit of the regional economy, (iv) Increase new knowledge inputs to the economic sectors of smart specialization and (v) Increase public expenditure for Research, Technological Development and Innovation (RTDI)
- Afterwards, the *baseline situation* in the region with respect to this investment priority is mapped upon the examination of the region's outputs, assets, strengths and weaknesses. This exercise is documented through monitoring indicators sourced from publically available data sources, including the Hellenic Statistical Authority, the Greek National documentation Centre, the Innovation Union Scoreboard, and the Greek Operational Programme: "Competitiveness, Entrepreneurship and innovation"
- In sequence, the following section identifies the *actions* implemented with regards to the Investment Priority, by looking into the regional Operational Programme of the region, as well is into the Sectoral Programmes for Competitiveness and Entrepreneurship and Agricultural Development.
- Afterwards, the *regional innovation policy instruments* used in the region are analysed. These instruments are categorised as underpinning (i) knowledge production, (ii) knowledge dissemination and (iii) knowledge exploitation.
- Finally, the indicators and special charts produced automatically by the M3 Platform are created. This process allows the user to assess the effectiveness of the actions implemented and the effectiveness of the used policy instruments, through a monitoring of changes of outcome and result indicators.

4. Closing Remarks and Further Work

This paper elaborated on the concept and significance of monitoring and evaluation in a RIS3 context, while it also presented the types of indicators used in RIS3 monitoring. Most importantly, it presented the M3 platform, and more specifically the design process, the platform modules, how the platform can be accessed and used, and a pilot use case of it on the region of Kentriki Makedonia, Greece.

URENIO Research is currently in the process of advancing the presented M3 method and tool into two new distinct tools for RIS3 Monitoring and Evaluation, in the context of the EU funded Horizon2020 Research Project ONLINE-S3. Advances in these two new tools include the creation of the RIS3 monitoring system around specific actions, and the automation of statistical data entry, in contrast with M3, where data is entered manually.

Annex

Table 2 Example of selected indicators for Investment Priority 1a: Strengthening research and innovation infrastructures

Output indicators	
REGION CODE]-O-0001	Number of research infrastructures that are subsidised
[REGION CODE]-O-0002	Number of new researchers in supported entities
[REGION CODE]-O-0003	Number of researchers that are employed in improved research infrastructures
[REGION CODE]-O-0004	Number of enterprises that collaborate with research institutes

Result indicators	
[REGION CODE]-R-0001	Average number of citations per publications of Greek researchers (Impact Index)
[REGION CODE]-R-0002	Common scientific publications between public and private entities per million of population
[REGION CODE]-R-0003	Common scientific publications with international partners per million of population
[REGION CODE]-R-0004	Participation of Greek enterprises in Horizon 2020 proposals
[REGION CODE]-R-0005	Researchers in enterprises

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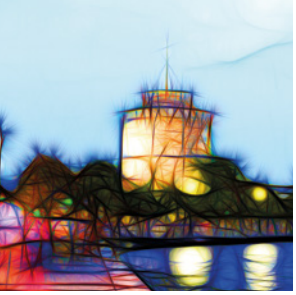

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FOSTERING THE NATIONAL INNOVATION SYSTEM THROUGH TRIPLE HELIX COLLABORATION: THE CASE OF ZAGREB

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Catching up countries with low or moderate innovation performance, such as Croatia, tend to focus on top-down approach and centralised implementation of innovation policy instruments. Given the limited resources and knowledge, there is usually a strong rationale for such an approach. This paper explores opportunities for a more bottom-up approach based on co-ordination of different projects which entail an evolving collaboration of research institutions, companies and local administration. The paper provides an overview of the innovation policy and challenges within the national innovation system in Croatia, which is followed by an analysis of triple-helix collaboration in the City of Zagreb. Initial results indicate that local triple helix initiatives in key cities/regions, which exploit and develop existing resources and linkage, can contribute to bridging the gap between science and industry, foster an increased number of proposed and implemented RDI projects and enable a stronger ecosystem for innovative start-ups. Too strong reliance on external financing may lead to suboptimal choice of projects and increase regional disparities within a country. The development of the start-up population is not necessarily strongly linked to RDI, as their development patterns tend to differ and their founders and investors may face shorter time horizons.

Keywords
Croatia, Innovation Policy, National Innovation System, Smart Specialisation, Triple Helix

1. Introduction

The role of the innovation policy is to compensate the market-based and systemic problems in the national innovation system (NIS) [1]. R&D processes are becoming more complex and context-dependent. In the conditions of globalised society and knowledge-based economies, innovation increasingly depends on the interaction of the individuals, enterprises and knowledge institutions in a particular sector on different levels - local, regional, national and global. The management of innovation policy has thus become a strategic task. Innovation policy should foster competitiveness and technological upgrading of the economy and therefore stimulate economic growth and socio-economic development. The desirable innovation policy, therefore maximises the effects on the level of the whole economy, rather than on the level of several isolated sectors or small number of high-technology enterprises which tend to be located in major urban centres and the most developed regions.

However, these tasks are constrained by the availability of resources in public and private sectors, as well as by efficiency of their use and available management capabilities and knowledge. The complexity of innovation policy tends to increase with the differentiation of the national innovation system. In their development of national systems of innovation, catching up countries with low or moderate innovation performance tends to focus on top-down approach and centralised implementation of innovation policy instruments. Given the limited resources and knowledge, there is usually a strong rationale for such an approach.

Etzkowitz and Leydesdorff [2] rightfully claim that '…national systems of innovation can be more or less systemic.' Although systems constantly change and can be expected to remain in transition, the functionality of interrelationships among actors within the system can and should be analysed. A higher degree of 'systemness' is often associated with innovation systems composed of actors immersed in dense networks of co-operation which create agglomeration effects and synergies. Such conditions are often related to similar or interdependent strategies and/or geographical proximity of the actors involved in clusters and networks. The more recent concept of smart specialisation builds upon notions and practices of entrepreneurial discovery that leads to preferential support to the economic activities with the greater potential impact on regional development [3].

This paper explores opportunities for a bottom-up approach based on co-ordination of different projects which entail an evolving collaboration of research institutions, companies and local administration. Under certain conditions, such a dense collaboration network offers a potential for a strong contribution to the national innovation system as well. In the case of Croatia, such opportunities emerge from access to European Structural and Investments Funds (ESIF) and Horizon 2020 which complement limited availability of national sources.

The paper is built upon two methodological pillars – an analysis of innovation policy in Croatia, including the key challenges within NIS (which is primarily based on RIO country reports [4],) and a case study of the City of Zagreb as a key contributor to innovative activities. The paper analyses the actual and potential contribution of the innovation system of the City of Zagreb to the implementation of the national innovation strategy and smart specialisation strategy. After this introduction, the next section provides an overview of the innovation policy and challenges within the national innovation system in Croatia. That is followed by an analysis of triple-helix collaboration in the City of Zagreb, as well as by some concluding remarks.

2. Innovation Policy and National Innovation System in Croatia

2.1 An Overview of Innovation Policy

In 2015 Croatia's gross expenditure on R&D amounted to 0.85% of GDP (0.79% in 2014). Due to the effects of economic crisis and a prolonged recession which lasted for six years, this level is almost the same as in 2008 (0.88%). In comparison to other EU member states, Croatia has one of the lowest levels of R&D intensity and it is unlikely to reach the national target of 1.4% of GDP by 2020. In particular, business expenditures on R&D in 2015 amounted to 0.44% of GDP, which is much lower than the EU 28 average (1.3%). This unfavourable structure indicates that R&D and innovation (RDI) expenditures still tend to be policy-driven, rather than market driven.

Reliance on ESIF is likely to continue such orientation, and expectation of further competitive funding from Horizon 2020 and similar programmes may shift focus of policymakers from the need to provide a facilitating national framework and funding which can serve as an important impetus which should come before internationalisation of RDI activities.

The governance of RDI system is centralised at the national level, with a weak regional dimension. R&D policy falls mainly within the authority of the Ministry of Science and Education with innovation aspects dealt by the Ministry of Economy, Entrepreneurship and Crafts. Moreover, Ministry of Regional Development and European Funds has acquired a crucial role as the managing authority for programming and allocation of ESIF for financing RDI activities. The Croatian Science Foundation is the main funding body for financing of competitive basic research, whereas Agency for Science and Higher Education is responsible for setting up a national network for quality assurance and evaluation of scientific research and higher education National Council for Science, Higher Education and Technological Development plays an advisory role. The Croatian Agency for Small Business, Innovation and Investment (HAMAG-BICRO) is responsible for supporting innovative entrepreneurship, Europe 2020 Strategy and absorption of the ESIF, whereas Agency for Investments and Competitiveness facilitates national competitiveness clusters. Some calls are also managed by the Ministry of Economy, Entrepreneurship and Crafts. [4]

Croatia's RDI policy has suffered from the lack of co-ordination and continuity. Low commitment has contributed to low levels and high volatility of R&D funding and has hampered long-term orientations as regards human resources, and investment in innovation [5]. Fragmentation of national research and innovation system has not been adequately addressed since the initiation of innovation policy in 2001 [4] [6], due to the lack of synergies between ministries and agencies responsible for research on the one hand and entrepreneurship and economy on the other. More recently, in the context of preparation of framework for ESIF absorption, reforms targeted at building a more coherent and integrated RDI policy framework have been undertaken. The 2014-2020 programming period is Croatia's first full cycle with access to ESIF, which will provide an important source of financing for both public and private sectors. As it has been observed in [4], the reforms led to certain improvements of RDI governance, primarily through the adoption of new strategic documents (with a focus on Smart Specialisation Strategy), re-organisation of management structures and support instruments. It remains to be seen whether that will lead to improvement of resources' allocation efficiency and the framework conditions for business. Smart Specialisation Strategy aims to link all the relevant aspects from the various national strategies into a coherent strategic framework. The complexity of its implementation will require strong commitment of relevant institutions and development of policy implementation capabilities at national and regional levels.

The gap at the regional and local levels has been particularly pronounced. Despite a reasonably well-developed network of universities (including their technology transfer offices) and entrepreneurship support institutions, only one innovation policy measure (Proof of Concept) has ever been implemented with strong participation from the local level. Despite positive experiences in terms of widening participation and growth of local capabilities, this approach has not been extended further, and the Croatian innovation policy remains heavily centralised. Given that key public and private RDI actors also tend to be located in major urban centres, this creates a challenge to regional development as well.

In 2016 the Ministry of Economy, Entrepreneurship and Crafts and Ministry of Science and Education have launched first ESIF calls, including Competency and development of SMEs,

Innovations in newly established SMEs, Increasing the development of new products and services resulting from R&D activities, Support to the development of centres of competence has been published and Centres of research excellence. In addition to research infrastructure call which is expected in 2017, the calls for centres of research excellence and centres of competence (which involve research institutions and companies) are crucial for setting up research infrastructure and projects, ranging from basic to applied research and experimental development over the next 3-5 years. As such, they are important building blocks for the implementation of the Smart Specialisation Strategy.

2.2 Challenges within the National Innovation System

In addition to building a coherent and integrated R&I policy framework, [4] identifies several other important challenges within the national innovation system. As outlined above, the challenge which receives most attention from policymakers is the need to increase RDI funding, primarily through absorption of ESIF. Despite the ongoing efforts, the situation related to R&I investment has not changed much after the EU accession. Programming and implementation of policy measures tend to take time, whereas market incentives for investments into RDI are insufficient. Based on the past programming experience, Croatia will need to invest more efforts to ensure adequate capacities for absorption of ESIF for the benefits of national development [7]. The effectiveness of future absorption will depend on policy and administrative capabilities of public sector institutions and absorptive capabilities of public research institutions and business enterprises.

Another important challenge, which is interlinked with the previous one, is strengthening of the business sector RDI capabilities and improving of the business innovation environment [4]. Innovation capacity is negatively affected by several factors – both within companies (lack of resources and capabilities) and outside of them (insufficient public funding prone to delays and administrative burdens and unfavourable market conditions). Therefore, both the private investment in RDI and public funding for business RDI remain low, which then leads to weak performance, e.g. in terms of designs and trademarks, SMEs innovating in-house and SMEs introducing innovation [8]. The overall result of this "low-level equilibrium" is insufficient demand for and supply of innovation-related services and research" [7]. Addressing this challenge requires evaluating the needs of the business sector and (re)designing and implementing policy instruments in a more coherent and strategic manner. Moreover, framework conditions should also be improved, especially for new market entrants which can offer innovative products, services and technologies and challenge the incumbents. Additional efforts should also be invested into internationalisation of companies in general and SMEs in particular in order to take advantage of EU and global markets.

The final challenge analysed here involves strengthening of the public RDI capacity. Public research and its transfer into the economy remains essential for innovation despite the challenges to the traditional linear science-push models of innovation development in favour of market-pull and open innovation, as well as the nonlinear dynamics due to ongoing interaction of actors involved - cf. [2]. Largest Croatian universities remain fragmented, with faculties usually organised as separate legal entities. Coherent long-term planning, setting research priorities and facilitating innovation and science-industry collaboration remain a challenge which is successfully addressed only by some faculties and departments. Public research institutes are somewhat more flexible in their management practices. They mostly focus on basic research,

and remain weakly linked to both universities and companies. Although public research is still largely underfunded and fragmented, there have been improvements in governance. Responsibility for financing competitive research projects was transferred to the Croatian Science Foundation, which implemented a more rigorous project evaluation process aimed at selection of fewer high quality research projects. Moreover, thirteen centres of research excellence were established in 2014 and 2015. Following their financing from the state budget, a restricted call made ESIF funding available to them as well. [4]

In 2011, an evaluation by Švarc [9] indicated that in Croatia, the systemic model of NIS was substituted by a fractionalised and narrow-scope version. The identified factors included a complex set of mutually interconnected factors, including economic deficiencies, public administration deficits, mind set of the political elite and socio-cultural factors not conducive to innovation. Despite significant changes and some improvements in the meantime, it can be argued that these criticisms are still at least partly relevant.

3. Triple-helix Collaboration in Zagreb

Since the dominant top-down approach to innovation policy has not resulted in a viable national innovation system, opportunities to complement it via a bottom-up approach should be explored. In particular, this is related to a more a more effective triple-helix collaboration. When discussing such collaboration, its most desirable form is what [2] name 'Triple Helix III', i.e. a knowledge infrastructure of overlapping institutional spheres, whereby academia, state and industry each take the role of the other and whereby hybrid organisations emerge at the interfaces. This does not only entail the transformed relationship of university, industry and government, but also internal transformation within each of these spheres. Such structures and relationships transcend both the 'etatistic' model in which the government dominates other spheres (e.g. through regulation and financial incentives) and the 'laissez-faire' in which the roles are prescribed and the coordination between universities, industrial and government actors is weak.

At the national level in Croatia, triple-helix collaboration is currently implemented through national competitiveness clusters which are active in sectors defined by the Industrial Strategy 2014 – 2020 and which gave support to the development of the future centres of competence. Additional advisory bodies are planned within the Innovation Network for Industry, whose functioning will also steer the future steps in smart specialisation.

In this paper, we analyse the potential of a more localised approach based on co-ordination of different projects which entail an evolving collaboration of research institutions, companies and local administration, using the example of the City of Zagreb. As the capital, Zagreb is endowed with a critical mass of resources and actors in academia, business and public sector organisations, which have a potential to foster knowledge-based development. The co-operation projects which emerge currently mostly target financing from ESIF, including research infrastructure, science-industry RDI co-operation, centres of competence, business support institutions (with a focus on new technology based firms and start-ups). This agglomeration of resources and projects is primarily path-dependent and often stems from centralisation which characterises Croatia, rather than from strategic rationales of the actors involved. For example, 11 out of 13 centres of research excellence are based in Zagreb, as well as 11 out of 34 proposed centres of competence. This points to a high degree of centralisation within the RDI system, but also creates opportunities for synergies at the local level which can spill over to the

national innovation system as well. Realisation of the potential for triple-helix collaboration involves a complex process of reform, co-development and mutual adaptation. In some cases, co-operation is motivated by risk minimisation and joint advocacy (e.g. in the case of collaborative research and science-industry projects in particular), whereas in others expected benefits and synergies are more pronounced. Some initiatives are also proposed by external actors (e.g. civil society, business angels, consultants etc.). Access to ESIF can play a useful role of providing tangible incentives and synergies to the aforementioned processes.

Although the projects around which triple-helix collaboration revolves around are in line with national strategies and the Zagreb development strategy, they are not directly related to their (top-down) implementation. The co-operation is based on a co-operation agreement between the academia and local government, signed in September 2015, which covers supporting the start-up and spin-off companies that arise as a result of research, supporting students in their independent entrepreneurial ventures, organising specialised events, networking scientists and students with innovative entrepreneurs, linking research infrastructure and further development of the University Innovation Network (which involves university faculties, companies and support institutions). [10] Specific projects which often involve start-ups or other business ventures are covered by separate agreements and joint project applications.

The pivotal role in the triple-helix cooperation is played by academic institutions as producers of new knowledge, primary initiators of many collaboration projects and large beneficiaries of ESI and Horizon 2020 funds. That is in line with a claim in [2] that academia can play an enhanced in innovation in increasingly knowledge-based societies. A crucial player in this area is the Ruđer Bošković Institute, as the largest public research institute in Croatia whose research is focused on natural, biomedical and technical sciences. As for the University of Zagreb, despite some valuable efforts at the university level (e.g. related to technology transfer, innovation and science-industry co-operation), its fragmentation into separate faculties often prevents it from taking advantage of its size and complexity. Consequently, the faculties which display a proactive approach to RDI and entrepreneurship, such as the Faculty of Electrical Engineering and Computing, often act independently or in coalition with other faculties and/or the Ruđer Bošković Institute.

When it comes to the local government, the main counterpart to research institutions is Development Agency – Technology Park Zagreb. This local development agency provides pre-incubation and incubation services at its facilities, as well as education, training, mentoring, networking and some financial support. A recently developed project StartUp Factory Zagreb - incubator for high technology involves spatial expansion and enables access to advanced technologies to start-ups and other SMEs in a cost-effective manner. Research institutions are partners in this project, which will also facilitate academic entrepreneurship and the growth of university spin-offs. At the strategic level, triple-helix collaboration is usually supported by the City Office for Economy, Labour and Entrepreneurship.

Participants from the private sector take part in collaborative projects in accordance with their interests, strategies and capabilities. Start-ups are attracted by support services provided by the Technology Park Zagreb, as well as by the annual Zagreb Connect conference, which has become one of the largest events of its kind in Southeast Europe. Start-ups in Zagreb are also assisted by several private, non-profit initiatives which provide co-working, pre-incubation and incubation support, and facilitate access to finance. Established innovative SMEs are primarily focused on financial support measures (e.g. for innovation and internationalisation) provided by the City of Zagreb, with some interest in collaborative research. Larger companies focus on

science-industry collaboration on specific RDI projects co-financed by ESIF. There is a gap related to demand-side policy measures both the national and at the local level. Given the variety of its needs and the size of its public procurement budget, the City of Zagreb and public enterprises owned by the City are in a good position to initiate and pilot such policy measures in the future.

Based on ongoing collaboration between the University of Zagreb, the Ruđer Bošković Institute and local administration, key RDI projects which are co-financed by ESIF and/or business sector are being gradually interconnected, with a potential to integrate them into a mutually reinforcing ecosystem. Although the projects are developed locally, they mostly depend on external financing, as their approval, monitoring and evaluation are done at the national and EU levels.

Due to the complexity and duration of preparation, evaluation and implementation of most projects, at this stage of sustained triple-helix collaboration it is still too early to assess outcomes and externalities generated by co-operation initiatives and projects. However, it seems that the existence of incentives obtained through ESIF will be exploited by innovation system actors which possess not only competence in their field of expertise but also in establishing partnerships and co-evolving with their partners. This creates positive feedback loops in terms of increased number of proposed and implemented RDI projects and established start-ups.

At this early stage of co-operation, there are also some discernible gaps and challenges. Currently, co-operation is often opportunistic rather than strategic; a larger role is played by financial incentives provided by ESIF, than by recognised market opportunities and development objectives. A cornerstone of triple-helix collaboration is entrepreneurial university, which has a proactive role in producing, sharing and utilising new knowledge. Due to its fragmentation, University of Zagreb as a whole has had difficulties in moving towards that goal - cf. [5], which is recognised and sought after only by its more entrepreneurial faculties. Long-term sustainability of RDI projects and innovative start-up is not tackled adequately. Moreover, the involvement of companies of all sizes in RDI projects should be strengthened, on the basis of further research into the needs and capacities of enterprises. According to a study done in 2014 [11], the identified measures that can promote the development of innovation and strengthen export activities of entrepreneurs included the improvement of research and technology, networking, attraction of foreign investment, removal of administrative barriers, financial support for innovation and export activities of companies and support to human resources development. The issue of absorptive capacity of companies to take advantage of new knowledge and adapt imported technologies is also often overlooked – and this capability is essential for innovation and economic growth in catching-up economies such as Croatia [12].

4. Conclusions

Initial results indicate that local triple helix initiatives in key cities/regions can contribute to bridging the gap between science and industry, foster an increased number of proposed and implemented RDI projects and enable a stronger ecosystem for innovative start-ups. That can also contribute to the effectiveness of the national system of innovation, as well to the implementation of the innovation policy. However, the strength of these effects is likely to vary and depend upon specific conditions in a given environment.

To be successful, such initiatives need a critical mass of resources and existing linkages. However, there are also risks and limitations involved. Too strong reliance on external financing

may lead to suboptimal choice of projects, and synergies with Horizon 2020 and market-driven innovation are sometimes difficult to achieve and sustain over time. Furthermore, the development of the start-up population is not necessarily linked to complex RDI, as their development patterns tend to differ and their founders and investors may face shorter time horizons. Finally, the success of local triple helix partnerships can also lead to disproportionate utilisation of ESIF by metropolitan regions and thereby can increase regional disparities within a country.

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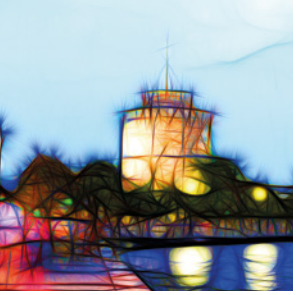

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SMART SPECIALISATION STRATEGY DEVELOPMENT IN THE FINNISH REGIONS: CREATING CONDITIONS FOR ENTREPRENEURIAL DISCOVERY

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The European Union (EU) has adopted smart specialisation as an innovation (industry) policy framework to boost innovation and economic growth in EU regions. The central element of smart specialisation is Entrepreneurial Discovery Process (EDP) that can be defined as a bottom-up process involving businesses, research sites, public organizations and civil society working together to identify region's most promising specialisation areas and to overcome the potential weaknesses that hamper innovation. Despite the widely recognized status of EDP as a driver of regional innovation and economic transformation, its operationalisation has remained a challenge. We set out to investigate this with a research question: "What are the key factors underlying EDP and how to implement them for supporting entrepreneurial discovery in the region?" To answer this question we adopted a grounded theory approach and explored the dynamics of EDP through a case study in Finnish regions. Based on our interviews with 13 process facilitators of smart specialisation strategy development in 10 Finnish regions, we identified openness, engaging, networking and continuous interaction as the key factors underlying EDP. We further illustrate a process model of EDP. Our findings contribute to the theoretical debate on what constitutes EDP in the context of smart specialisation.

Keywords
Entrepreneurial Discovery, Innovation Policy, Innovation Strategy, RIS3, Smart Specialisation

1. Introduction

The key notion of smart specialisation was conceived in the EU's expert group "Knowledge for Growth" with Foray et al. [1], and in a short timeframe developed into EU's cohesion policy [2]. EU has set research and innovation strategies for smart specialisation (RIS3) as a precondition for all EU regions to receive funding from European Regional Development Fund (ERDF) and from EU Structural and Cohesion funds. To fulfil this precondition EU regions are required to identify the key activities, areas or technological domains in which they can have

competitive advantage, also globally, and to focus their regional policies to promote innovation in these fields [3].
The key principle that differentiates RIS3 from other innovation and industry policies is the entrepreneurial discovery process [3]. EDP as a concept is grounded in the work of Kirzner [4], which emphasises the role of knowledge and discovery and the views of Hausmann & Rodrik [5] on economic development as self-discovery. EDP can be defined as a bottom-up approach where stakeholders work together to discover and produce information about new activities and the government assesses the outcomes and empowers those most capable of realising the innovation potential [2] [5] [6]. The concept of entrepreneur here is understood in a broad sense (companies, higher education institutions, research institutes and individual citizens) to include anyone who is in the best position to be creative in integration of different approaches for new market opportunities [7]. The government needs to consult various stakeholders, as it alone has imperfect and incomplete information [8]. The role of private sector is to discover and produce information about new activities, and the role of the public sector, policy-maker, is to provide conditions for the search to happen, assess potential and empower those actors of most capable of realizing the potentials [3].
In order to succeed in RIS3, a lot of demands is put on policy-makers. They need to change the logic from absorption of funds and the accounting of expenditures, towards facilitating the strategy process and working towards the goals, objectives and performance set there [6]. In order to do that policy-makers needs to engage in an ongoing relationship with private sector [5]. They need to put emphasis on developing incentives for entrepreneurs to discover new domains, new mechanisms to detect novel ideas, supporting experimentation, building of inter-regional linkages and new educational programmes [3]. This means allowing for experimentation, which is typical of entrepreneurs, not of public sector. The main question for policy makers is: who has or where is the entrepreneurial knowledge and how to integrate the fragmented knowledge base so at to generate exploration and discovery projects [2].
Despite the strong emphasis on EDP in the context of RIS3, there are nearly no studies studying what constitutes entrepreneurial discovery [9]. Prior work has defined that EDP should identify and prioritise existing regional initiatives and potential processes on agreed regional criteria and objectives, and to support those initiatives included in the strategy [9]. However, how to do that in practice is still left unanswered, as there is lack of clarity and consensus of the concept of entrepreneurial discovery. While EU has published RIS3 guide [10] and S3 implementation handbook [11], regions are still in need of clearer instructions [12] [13]. Our research sets out to explore the actual dynamics of EDP in Finnish regions through interviews with RIS3 process facilitators. We aim at contributing to the theoretical debate on what constitutes EDP and how it manifests itself in the different phases of RIS3 process.

3. Research Methods

We adopt a grounded theory approach [14] [15] [16] being an appropriate method to examine a phenomenon that is dynamic in nature and for which there exists little prior knowledge. Our research is based on multiple cases, which allow us to compare our findings from different regions. This in turn supports the development of a more accurate, generalizable theory than

single cases [17]. We utilize semi-structured interviews as our primary data source, which is typical of studies based on grounded theory approach [15].

3.1 Sample

We identified our sample from EU´s Joint Research Center (JRC)'s smart specialisation platform [18] in September 2016. At that time it included contact information for RIS3 responsible persons in 14 Finnish regions (out of 19). We included one additional region to whom the second author had the contact information. We contacted the responsible persons by e-mail and proposed a phone interview in September 2016. A few days later we called to those that had not replied to the e-mail. Finally, 10 regions accepted the 1-hour interview invitation, which we considered as a sufficient sample, covering slightly over half of the Finnish regions. All interviews were conducted as phone interviews, except for Helsinki-Uusimaa that was conducted face-to-face as being the region of our location. Table 1 provides a full list of regions that participated in the study, the organisation, the title of informants and interview date.

Table 1 Regional interviews

Region	Organisation(s)	Title of informant(s)	Interview date
South Ostrobothnia	The Regional Council of South Ostrobothnia	Manager of International Affairs	2016-09-19
South Savo	South Savo Regional Council	Development Manager	2016-09-20
Helsinki-Uusimaa	Helsinki-Uusimaa Regional Council	Innovation Adviser	2016-09-20
Central Ostrobothnia	Regional Council of Central Ostrobothnia	Manager of International Affairs	2016-09-20
Central Finland	Regional Council of Central Finland	Development Manager	2016-09-28
Ostrobothnia	Regional Council of Ostrobothnia	International Coordinator	2016-09-19
Oulu Region	Council of Oulu Region	Development Manager	2016-09-14
Satakunta	The Regional Council of Satakunta	Regional Advisor	2016-09-26
Southwest Finland	Regional Council of Southwest Finland	Senior Planning officer, Senior Planning officer	2016-09-14
Kymenlaakso	Cursor Oy, Kymenlaakso University of Applied Sciences (KYAMK)	Project Manager, RDI Director, RDI Expert	2016-09-14

3.2 Data and Analyses

Our interviews were semi-structured, following the questionnaire, but also leaving room for the respondents to openly express their views. The questionnaire concerned the practices, participants and the results of the latest smart specialisation strategy round in the regions. In addition to primary research data, we also collected secondary research data such as regional smart specialisation reports, presentations and related publications to get further

information of regional smart specialisation practices. This type of triangulation allows us to validate the findings, as we utilize several data sources [19].
We recorded, stored and analysed interviews through Atlas.ti software for qualitative analyses based on grounded theory approach. We first identified the activities and statements related to EDP and its operationalisation. We then coded these activities and statements with one sentence that described the essence of that specific activity or statement. We ended up having altogether 65 1st order terms, which we analysed through grouping similar terms with each other and labelling them under similar themes. These 2nd order themes we then developed into aggregate dimension describing the underlying category. We illustrate our data structure in Figure 1 in the chapter - Findings.
We present only a few selected 1st order terms to maintain the readability of Figure 1. After identifying the data structure, we started to develop a grounded theory model that shows the dynamic relationships between the concepts, themes and aggregate dimensions. The purpose of the model is to show the dynamic relationships between the newly derived concepts [16]. We present our model in Figure 2 in the following chapter. Finally, we compare our model with existing theories in the field to understand how our findings contribute to existing knowledge, which we discuss in the final chapter.

4. Findings

4.1 Finnish regional innovation landscape and the smart specialisation process

Finland has been characterised as Innovation Leader in EU Innovation Scoreboard, having position score 125% over EU average in 2015 [20]. In the regional level, Helsinki-Uusimaa is characterised as Innovation Leader and the rest of Finnish regions as Strong Innovators [21]. While Finland has firmly established regional innovation platforms, the focus in recent years have been to complement the traditional science-technology-innovation (STI) mode of innovation with doing-using-interacting (DUI) mode of innovation [22] [23].
According to our interviews, the RIS3 process is typically facilitated by regional council in Finland and forms part of the regional strategy. The Finnish regions have been accustomed to develop regional innovation strategies prior to smart specialisation policy. The importance of smart specialisation policy has been to foster the regional networking in the context of innovation and to further emphasise the international angle. All studied RIS3 processes involved large group of stakeholders representing triple or quadruple helix partners.

4.2. Factors underlying EDP in Finnish regions

Figure 1 illustrates our research process and its key findings as identified factors underlying EDP that are “Openness”, “Engaging”, “Focused Networking” and “Continuous Interaction”. As an example, we identified openness through first identifying statements from interviews related to stakeholder involvement in RIS3 process, and as we grouped similar statements together we formed a common theme “Enabling all actors to participate”. Figure 1 shows

examples of statements and the total number of statements found related to each 2nd order theme. We only illustrate a few statements in order to maintain readability of Figure 1.

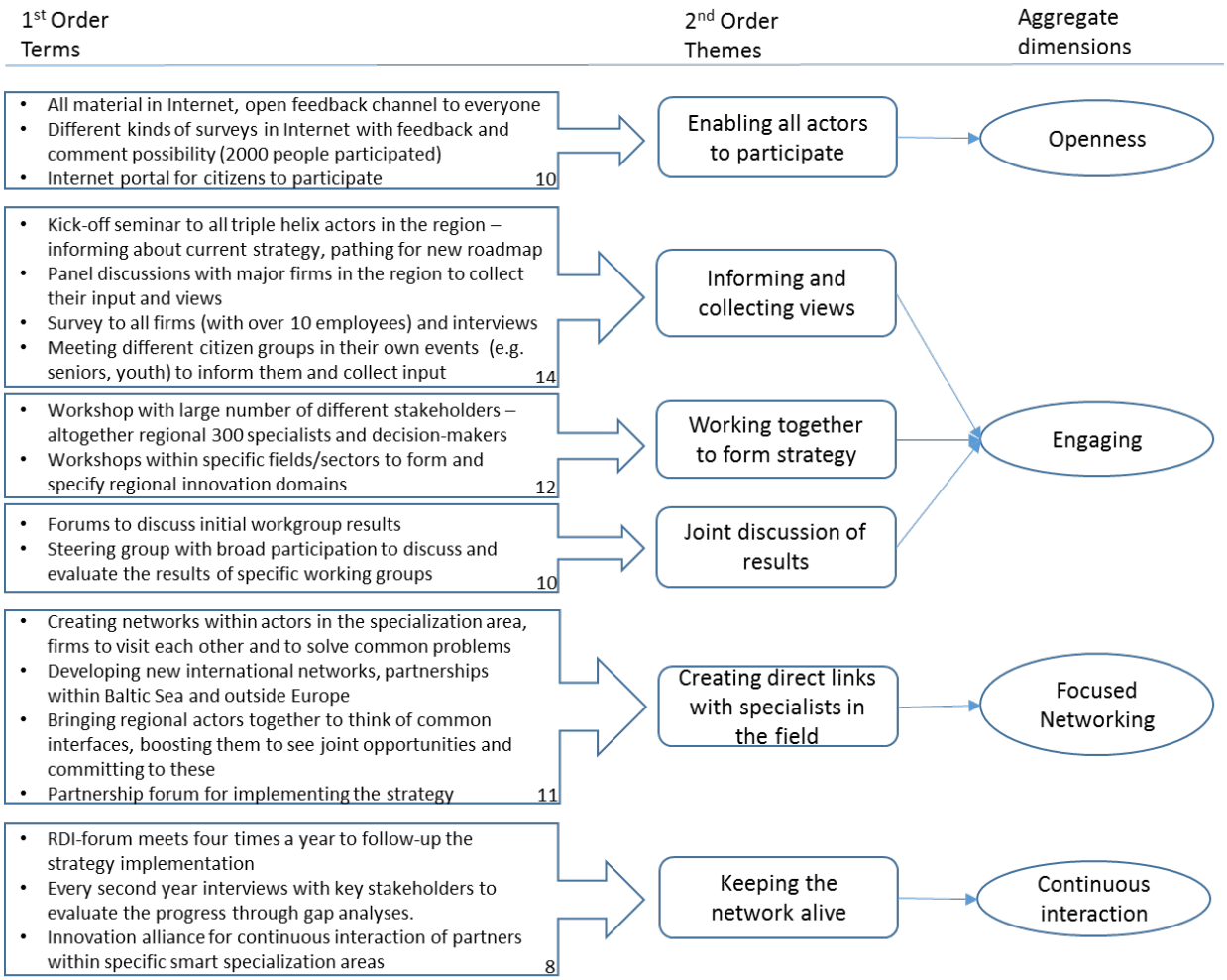

Figure 1 Data structure for identifying the factors underlying EDP

4.3 EDP process model

Figure 2 presents our EDP process model in smart specialisation context. We have organised the model in two phases – RIS3 strategy development and RIS3 strategy implementation. RIS3 strategy development involves two key principles for RIS3 policy-makers, which are to facilitate openness and engaging. As an example of openness, regional council in Central Finland has enabled all actors to participate in RIS3 process through having all material in Internet with open feedback channel to participate. As an example of engaging, Satakunta

regional council has participated in the meetings of diverse citizen groups to inform them and collect their views for RIS3.
RIS3 implementation involves two key principles for RIS3 policy-makers, which are to facilitate focused networking and continuous interaction. As an example of focused networking, Helsinki-Uusimaa regional council has organised events for the stakeholders within each priority area to facilitate the formation of direct relationships between the specialists. As an example of continuous interaction, the Finnish regions have adopted different mechanisms to keep the RIS3 network alive. For instance, Satakunta regional council organises Research, Development and Innovation Forums with participants from various stakeholder groups to meet four times a year to follow up RIS3 implementation. Oulu Regional council has formed an Innovation Alliance to enhance collaboration between different stakeholders in smart specialisation area. Kymenlaakso regional council has implemented a survey and South Savo regional council interviews with key RIS3 stakeholders to get feedback regarding the progress and performance of selected RIS3 strategy. The facilitation of continuous interaction is vital in order to lay sound bases for the next RIS3 strategy round to develop further regional smart specialisation strategies.

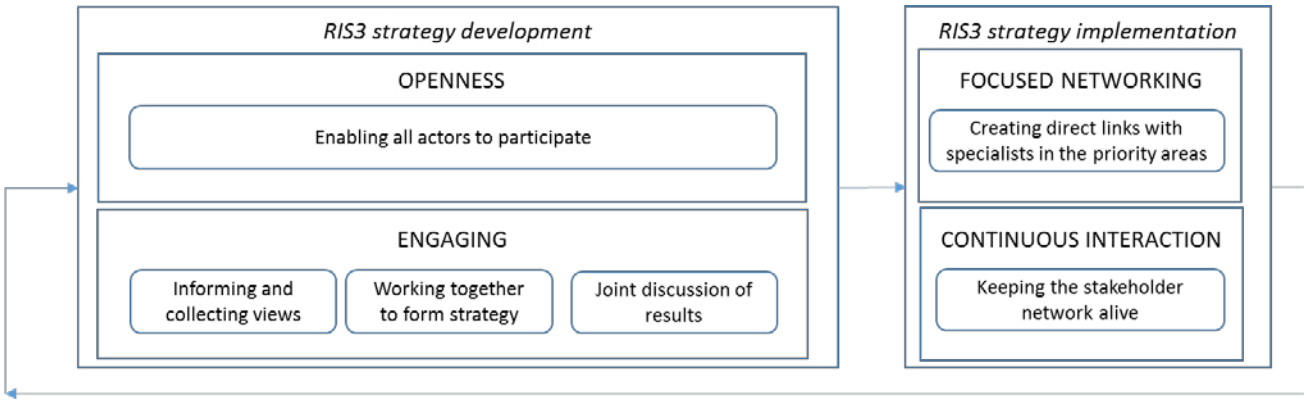

Figure 2 Process model of EDP in the smart specialisation context

5. Discussion

We set out to explore the dynamics of EDP in smart specialisation context in Finnish regions. Our research contributes to current theoretical debate and practice of EDP through opening the “black box” of stakeholder involvement in the context of smart specialisation. We identify the key factors underlying EDP - openness, engaging, networking and continuous interaction and develop a process model that illustrates how these factors are linked to each other.
When we compare our process model to other existing theories and frameworks, we find many similarities of it to social capital framework in strategy literature [24]. The factor of openness in our model is similar to enabling access of parties to each other in social capital framework [24]. This aspect has not been as central in the literature on smart specialisation that has primarily stressed the importance of triple helix partners. Our research provides a

few examples how to involve citizens in RIS3 process and have all material openly available for all citizens. The factor of engaging in our model involves key activities in RIS3 strategy development. It however does not clarify how exactly the engaging is performed. The motivation of actors to participate and to anticipate value of collaboration are key enabling factors in social capital framework [24]. This issue has also been raised in smart specialisation context regarding how policy-makers ought to develop incentives for entrepreneurs to participate [2] [3]. Our interviews did not shed light this aspect. This may be due to Finnish regional stakeholders being accustomed to collaborate with each other, as the public sector is an important financier in R&D projects between industry and academia. This issue may thus not be as difficult as in southern European countries [25]. Regarding whether the various actors are able to exchange and share knowledge, which is crucial to in social capital framework, our research emphasises the importance of the development of direct links between the specialists within smart specialisation priorities. Furthermore, similar to recent paper on EDP [9], our process model highlights that EDP needs to be adopted as a continuous process to fully facilitate regional innovativeness.

Our research has also practical implications. It defines the role of policy-makers in RIS3 process to be facilitating openness, engaging, focused networking and continuous interaction, and illustrates examples of implementation. As our research is based on a small number of interviews in Finland, the results cannot be generalized. We recommend future research to test the validity of our process model in other European countries and regions. Furthermore, we suggest future research to examine engaging part of our EDP process model in a further detail to shed light how to motivate regional stakeholders to participate in RIS3 process. This issue was not raised in our research, possibly due to the country-specific characteristics.

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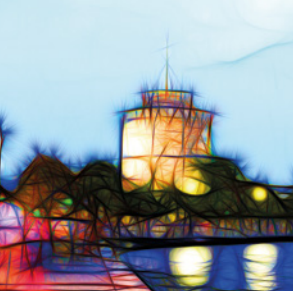

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UNIVERSITY-INDUSTRY COLLABORATION THROUGH BIG DATA AND OPEN SCIENCE

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There exists today little motivation for researchers to share their research data, which is their source of scientific reputation. This paper addresses this major challenge for open science and identifies alternative business models for researchers to open their data repositories for external users. Our research question is "How to open big data in a way that it can be transferred to sustainable business cases that bring value to data owners as well as potential external users?" Our paper is based on a case study of a Finnish foundation and its currently closed database. As key findings, we identify opportunities, barriers and possible solutions for opening this database based on 11 interviews with key stakeholders. Our research contributes to open science literature through illustrating how to open big data in a way that brings value to both data owners and external users.

Keywords
Big Data, Open Science, Open Innovation, Research Data, University-Industry Collaboration

1. Introduction

There have been many initiatives and actions to open government data in Europe to boost open innovation. Open government data means that data produced or commissioned by government or government controlled entities can be freely used, reused and redistributed by anyone [1]. In Europe, there is a pan European network offering advice on implementation of the (Revised) Public Sector Information Directive, best practices [2] and local guides [3]. While the open government data is already well established including the ways of operating and best practices, the open science is still in its infancy. Open science can be defined as a movement to make scientific research, data and dissemination accessible to all levels of an inquiring society [4].
The European Commission is running a pilot under Horizon 2020 called the Open Research Data (ORD) Pilot that aims to improve and maximize access to and re-use of research data generated by Horizon 2002 projects [5]. The project recognizes the different nature of research data from government data, and thus the need to balance openness and protection

of scientific information, commercialization and intellectual property rights (IPR), privacy concerns, security as well as data management and preservation questions [5]. Furthermore, EC has set up OpenAire2020 as a key infrastructure to monitor H2020 research outputs [6]. While the infrastructure and the policies related to open research data are being to emerge, the decision what data to open and how widely still rests on the individual researchers.

Our research takes an explorative approach to investigate how to motivate big data owners to share their data and how to get external stakeholders interested to exploit it through a case study of a database owned by a Finnish foundation, which we refer to as Foundation A. We utilize semi-structured interviews with key stakeholders as a method for primary data collection. The interviews focus on answering two key questions: 1) how to motivate the owners of the database to share their data and 2) what are the needs and wants of external scientists and industry to exploit this database. Based on 11 interviews with database owners, external researchers and open science experts, we identify alternative solutions to open the currently closed database of the Foundation A.

2. Literature review

Prior literature has identified various models for commercialisation of big data. In principle, these can be put under six different business models. They vary from simple data supplier to service provider based on whether the data is internal or external and what is done with the data (ranging from providing data for reuse, analysing and aggregating existing data or even providing services). Revenue model for the different strategies are mostly subscription based but can also entail “freemium”, pay-per-use or advertising [7]. Once an individual or organisation is comfortable with the notion of commercialising data they will start to release more data and try to move on to more complex business models as they generate more revenue. Complex business models are also harder to execute, prompting open collaboration and co-creation. Scientists need to realise that data ecosystems are essential for making most value out of their big data [8].

For universities, public research institutes and government to collaborate effectively with industry it is important to align the goals of these different organisations. They could form a Technology Transfer Alliance (TTA) and internet-based for-profit models owned by universities while giving rights to inventors and assisting with funding and commercialisation [9]. The challenges of open data can be mitigated by a boundary organisation that supports university-industry partnerships [10]. The boundary organisation, in exchange for sponsoring, allows companies to shape the research programme while funding universities that employ high-calibre scientists to do research on them. The key to overcoming scientists’ motivational challenge is through methods like mediated revealing and enabling multiple goals to co-exist that might not advance companies’ agenda but can achieve high scientific impact during a project. To address the reluctance of researchers to share their big data, it may be best for funding agencies to require that data supporting publicly funded publications should also be made publicly available [11].

However, merely sharing is it is not always enough since raw data itself is often not useable. This means data that is made public also needs essential metadata. Success cases for opening data can be considered the Bermuda Principles of Human Genome Project in 1996

and National Science Foundation (NSF) [12]. In the former it became common practice to make human genomic sequence data openly available in trustworthy data repositories. NSF requires its funded project to share its data with other researchers and the implementation of this is specified in a mandatory Data Management Plan. Publications have also started to use different strategies implementing data sharing. This includes research data as independent information object, data paper or enriched publication.

A collaborative way to adopt big data technologies involving researchers is the 3-legged big data environment strategy focusing on integrating developer community, researchers and business user [13]. The strategy is iterative and encourages collaboration between the three parties involved. It is considered helpful in addressing challenges like reusability, manageability, development scalability and maintainability. It is considered good practice for business leaders and researchers to work together to derive business value from big data. This is due to the technical nature of collecting, storing and analysing the data [14]. To ensure certain quality of the data, tasks like filter, cleansing, pruning, matching etc. should be applied at the earliest stage possible.

Much research and literature has been conducted on the commercialisation of big data in general as well as the needs and obvious benefits of opening up research data [15]. Furthermore, research on how to make this accessible has also been addressed [16]. However, with much emphasis on the open data and open science phenomenon further research is needed on how to actually create value and make use of the big data should it become open and accessible [9]. Our study on Foundation A aims at unveiling some results on this.

3. Research methods

Our research is based on a case study [17]. The role of the case study is to illustrate the underlying opportunities, requirements and bottlenecks for opening data repository for external users. Our main criteria for the selection of a case study is that it needs to provide potential to discover real challenges of opening big data, and to identify ways of overcoming these challenges.

We selected Foundation A in Finland as our case study, as it fulfils the above criteria, and it is readily available for us to study. They own a currently closed database with over 20.000 applications for funding, the funding decisions and the progress of funded applications.We invited all board members of the Foundation A (six persons) in the interviews and one old employee being expert in the topic having worked over 15 years with the database to identify opportunities and constraints related to opening the database. We then invited potential external users to the interview based on the convenience sample, the first author knowing them as doing related research to clarify their interest and needs for database. Furthermore, we invited experts in open science to the interviews to provide their view on the possible barriers and ways to solve them to open the database for external users. We conducted altogether 11 interviews in March-April. The interviews were conducted face-to-face, when convenient, otherwise by phone. The interviews lasted approximately 30 minutes. The informants received a memo of the interview notes, which they were able to verify and add further information. The list of interviews and the informants is presented in Table 1.

Table 1 List of interviews

Title of informant(s)	Organisation(s)	Interview date
Chairman of the Board	Foundation A	2017-03-23
Board member	Foundation A	2017-03-20
Vice Executive Director	Foundation A (until 2013)	2017-04-04
Department Vice-Head for Research, Assistant Professor	Aalto University, Department of Industrial Engineering	2017-03-23
Research Scientist	VTT Technical Research Center of Finland	2017-04-05
Assistant Professor	Hanken School of Economics, Entrepreneurship	2017-03-21
Postdoctoral Researcher	University of Jyväskylä, Department of Computer Science and Information Systems	2017-03-27
Legal Counsel	Aalto University, Research and Innovation Services	2017-04-04
Grant Writer	Aalto University, Research and Innovation Services	2017-04-05
Specialist	Aalto University, Research and Innovation Services	2017-04-06
Senior Statistician	Statistics Finland, Research	2017-04-04

We analysed the interviews through comparing the views of the owners, potential users and external experts in regarding the value and future use of the database. We also collected secondary research data regarding the database and open science strategies and the related business models. Having different data sources through triangulation we can validate our findings from interviews [18]. Based on the interviews and secondary data sources we developed a proposal for possible solutions related to the future use of the database. Based on the views of the key stakeholders, we furthermore selected two of the solutions of sustainable business cases that bring value to both data owners and potential users.

4. Case study

Our case is about a currently closed database that is owned by a Foundation A, which was founded in the 1970s. The foundation has supported thousands of Finnish private persons and small companies with granting conditional pay-back funding. The case study consists of interviews with key current and possible future stakeholders of the database. Based on interviews, we identified as opportunities for researchers with database to conduct high-quality academic research, for policy-makers to enhance current policies and for industries to develop or enhance own ideas as well as to search for potential partners. There are though remarkable barriers (legal, IPR and technical) for opening the database for external users. First, the database contains confidential information regarding individual people and companies. Second, there are technical barriers as the database is not developed for external purposes and thus there are no guidelines, no classification of data contents and no separate copies of it, which all are necessary requirements for external use purposes. These barriers lower the motivation of the Foundation A to share their database for external users, as there is risk that the external user would not treat confidential information accordingly and

could accidentally even destroy the whole database, as it is not possible to define different usage groups with different usage rights.
Based on the interviews, we developed alternative solutions to overcome the barriers. First option is to give an access right for selected researchers who sign NDA to utilize the database for research purposes (either free of charge or with yearly subscription fee). Second option is to develop a passive database with separate copy with anonymous data and restricted contents. Third option is to transfer (sell or give) the database to an external stakeholder such as Statistics Finland or National Archive. Figure 1 illustrates our findings from interviews regarding the underlying opportunities of the database, the barriers to open the database for external users and alternative solutions.

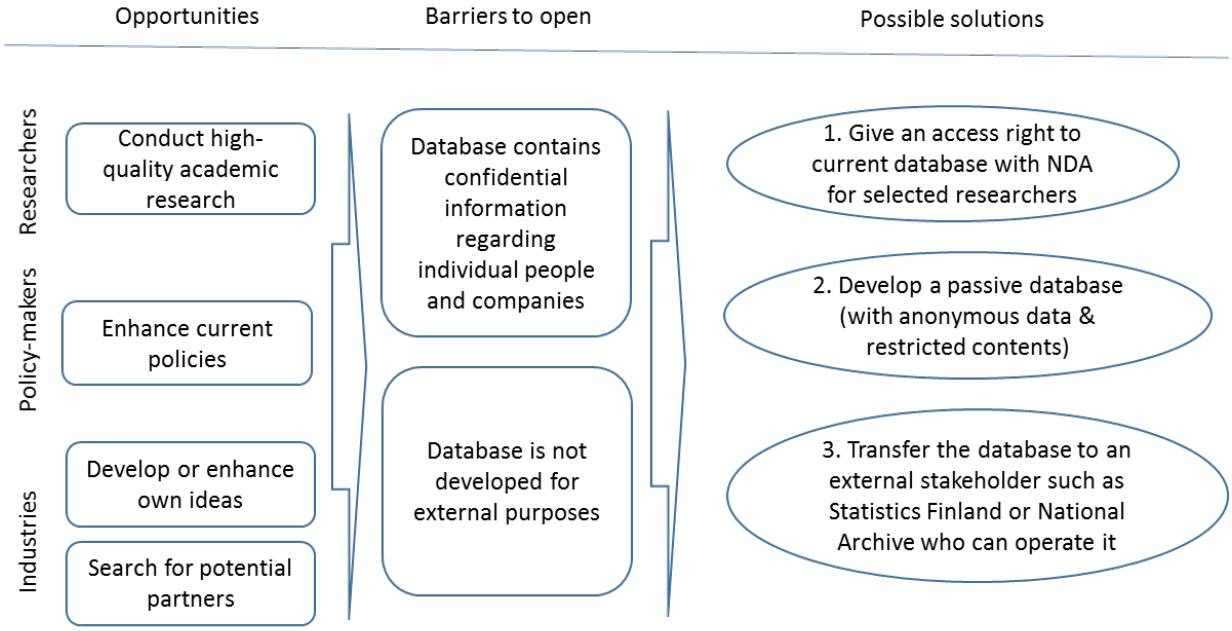

Figure 1 Opportunities, barriers and solutions related to the database of Foundation A

Based on the interviews with potential users of the database, we can conclude that there is initial interest towards the database. The database is seen as comprehensive, unique and large. The real research value of it comes from linking the database with other datasets e.g. from Statistics Finland, to understand the connections of individual people and companies and the influence of this. The willingness to pay for it depends on how well the data suits to researchers' specific research questions and objectives and how easy it is to use the database to collect the data needed. Typically, in commercial databases there is a person working with administrating the database, who researchers can contact for guidance and further information regarding the database. The data is then often anonymous for a researcher, and the administrator handles the raw data that is confidential. Our interviews reveal that when the following conditions are met, fit to the users´ specific research questions, easiness-of-use and the administrator support available, the researchers would be ready to pay for the access to the database. If only the first criteria is met, the researchers pay less.

When we compare the user requirements to our possible solutions we can conclude that our first and third solutions are viable. However, as the researchers would not be ready to pay much for pure access, the first solution could only work as an intermediate solution for the Foundation A as long as it has needs for the database. Giving an access right to selected researchers with NDA would support sharing some of the database costs and also offer possibility for the Foundation A to get better understanding about the real value of the database for researchers and other stakeholders. Our second solution about developing a passive database, is not very appealing to the researchers, as it is very relevant for research purposes to link the data to other data sets (on individual level). Thus, there would be no interest to pay for a passive database, and it would not be profitable for the Foundation to do that. Furthermore, this solution is not interesting to policy-makers and industries, as they also need the in-depth information in order to get value of the database. Our third solution to transfer (sell or give) the database to an external provider to administrate is also a viable one. In our interviews, two of the researchers would see this as a good solution of which they would be ready to pay, when they have closely related research projects. In this option the new owner of the database would act as an administrator taking care of the confidentiality issues according to high-quality, standards.

5. Conclusions

Based on our literature review we can conclude that the business models and infrastructures for open research data are emerging. However, as there is still relatively little open research data available, the question remains how to motivate and encourage researchers to start adopting these emerging models and infrastructures. Based on our interviews with open science experts, researchers today have too little knowledge about open science. Some researchers think that open research data means the data can be accessed by anyone whenever and for whatever purpose, similar to government data. However, this is not true as today researchers can themselves decide who can use their data and how. They can restrict the usage to only the members of their research team and then give conditional access to others e.g. to make a joint publication based on the data. In this way, they can also verify that the external user understands the nature of the data and its limitations. They can also define that the research data can be used only in research purposes, and in certain levels.

The key motivation for researchers to open research data is to get an additional publication based on it, as both the journal publication and the data publication are viewed as two individual publications. Opening research data also enables others to get interested in the work of the researcher, read it, cite it and possibly to develop joint collaboration around the research data. The problem today seems to be that the researchers are not aware of these additional possibilities to disseminate their research through publishing the research data. Only one out of the four researchers in our interviews had published open research data.

As the opening of the research data is still its infancy, there are limited possibilities for university-industry collaboration in open science. The current model is to collaborate based on a separate agreement. However, it is important to think ahead about open science and to develop communities around specific fields within participants from universities, industries and society. If the communities become successful, this will get researchers more motivated

to publish research data within them, as the network of potential users is already there. In our case of Foundation A and its database, we found as a long-term solution for it to be combining it to a larger data repository in Finland such as Statistics Finland. In this way, it would be openly available for everyone to exploit it, while the IPR and privacy concerns, would be handled by a database administrator. There are already many researchers doing quantitative research who have found the micro data services of Statistics Finland as a possible source of research data.

Our research contributes to open science literature though illustrating how to open big data in a way that brings value to both data owners and external users. As our research is based on only one case, we recommend future research to examine additional cases in other contexts. It would be important to highlight successful cases from opening research data for both open science and open innovation purpose from different research fields to demonstrate for researchers how to share the data in a sustainable way that brings value to all parties involved, and thus get them motivated to publish their own research data.

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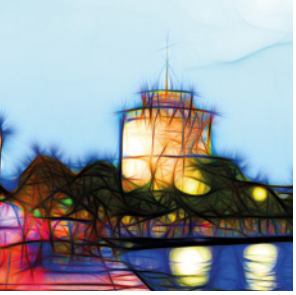

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REDISCOVERING CITIZENSHIP BY SUSTAINING SMART CITIES

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Developing smart cities as digital ecosystems and service platforms helps to rediscover and value the citizenship. Cities help for formation of citizenship being entities where people are learning to become good citizens. Within post-industrial and service economies and knowledge based societies cities tend to emerge as drivers and engines of social, cultural and economic urban development. Smart city is enabled by the use of technologies in order to improve competitiveness and ensure a sustainable development by combining networks of people, businesses, technologies, infrastructures, consumption, energy and spaces. Cities as service organizations provide infrastructures ICTs-enabled and digital platforms for advanced services to support business and improve quality of public life. Citizens planning smart initiatives contribute to improve services and quality of life for citizens reinforcing and rediscovering the meaning of citizenship as related to urban and local dimension by encouraging participation of citizens in urban and policy processes.

Keywords
Citizenship, Digital Ecosystems, E-government, E-services, Smart Cities

1. Introduction

The paper aims at explaining that developing smart cities as digital ecosystems and service platforms helps to rediscover the meaning of citizenship leading to build and develop sustainable cities. The study relies on archival and qualitative data drawn by analyzing and reviewing the literature on digital public ecosystems, on smart cities and the use of services platforms. The democratic citizenship refers to citizens acting as members of a political community constituting political spaces [1]. Cities following an e-government paradigm for actively engaging citizens and fostering civic participation are embracing new technologies of information and communication (ICTs) as services platforms and organizations driving service innovation for improving the quality of life of citizens [2, 3]. Cities as sustainable organizations contribute to create and share knowledge as to support the learning with resource integrators like people, consumers, citizens and businesses by establishing objectives related to social and environmental issues [4]. Cities of the future will be smart and sustainable communities, culturally strong and healthy along web information highways. Smart cities as ideal places for work and live play a central role for improving the

competitiveness of the urban system producing benefits for local and national economies surviving within knowledge an information based economies and societies [5, 6].
Smart cities managing ICTs for using and creating knowledge for creating public and social value offer high quality of life related to productivity, growth and human capital. Reinventing public services organizations by embracing ICTs relies on designing public institutions knowledge oriented as platforms or digital ecosystems for public and social value co-creation and co-production by sustaining change and service innovation searching for participation and collaboration by re-constructing civic identities. Technology offers cities as local public institutions and organizations the opportunity for rediscovering the importance of citizenship by sustaining a smart cities approach and smart initiatives.

2. New technologies for sustaining digital public ecosystems and reconceptualising the citizenship

According to Stewart (1995) the democratic citizenship refers to citizens acting as members of a political community constituting political spaces [1]. Within post-industrial and service economies and knowledge based societies cities tend to play a relevant role acting as drivers and engines of social, cultural and economic, urban and national development. Cities tend to emerge as privileged sites for considering the renegotiations of citizenship as the place where the business of modern society gets done, as salient sites for redefining citizenship with citizens contributing to redefine new contents of membership. Cities are sites and centers that help for formation and reformation of citizenship being entities where people are learning to become good citizens [7] designing social policy practices for developing and implementing the concept of urban citizenship occurring by introducing policy instruments for political integration, for appropriation of citizens' rights giving relevance to territorial citizenship in the context of multilevel governance [8]. Cities are embracing an e-government paradigm following two approaches in designing their web based service and managing information technology. The informational-oriented approach may offer a wide amount of content on web emphasizing directness and extensiveness in information presentation. The user-oriented approach categorizes information and services according to the needs of different user groups [2]. Within societies knowledge-based and ICT-enabled citizens, businesses and governmental organizations contribute to public value and knowledge creation [9] as active co-producers of public services by embracing digital technology [10] and relying on public organizations as infrastructures creating internet-enabled and digital platforms as ecosystems of economic and social innovation and accountability making available and accessible sufficient quality and useful data to citizens, consumers and businesses within networked systems for good government [11].
New digital technologies driving an increasing integration among private companies, no profit organizations and public institutions, civil society and citizens help to build a government 2.0 as citizen-centred and smart institution valuing integration, innovation and creativity, citizen centricity and engagement, promoting ecological development and sustainability, providing personalized information and services, making more informed decisions and improving the effectiveness of public policies and programs by adopting an

evidence-based decision making focused on an intensive use of data, by sustaining effectiveness, efficiency, equality, entrepreneurialism, resiliency and savvy technology [12].

3. Understanding the concept of 'smart city' for rediscovering citizenship

Cities of the future will be smart and sustainable communities, healthy, culturally strong and ideal places for work and live surviving within knowledge-based and global information economies and societies playing a central role for improving the competitiveness of the urban system producing benefits for the regional and national economy. Quality of life is high within smart cities and areas because of the connections between productivity, growth and human capital [4, 5]. Smart city is enabled by the use of technologies in order to improve competitiveness and ensure a sustainable future by linking and symbiotically combining networks of people, businesses, technologies, infrastructures, consumption, energy and spaces. Smart cities employ strategically and organically the ICTs as innovative support to management and delivery of public services based on public-private partnership to improve the quality of life for citizens and communities adapting to needs of the users and promoting a sustainable development coherently with technological and environmental advancements. Cities tend to behave as smart cities by seeking to address public issues via ICT-based solutions approaching a multi-stakeholder, municipally based partnership [13].
Nam and Pardo [14] refer to smart city concept in order to develop innovation by including three elements: technology for improving services and enabling a better use of tools technology-driven; organization for creating managerial capabilities for an effective use of technology; policy as mechanism for driving institutional urban problems addressing them to construct and enable a smart city. Smart cities initiatives as policy and managerial innovation permit to explain that a smart city is both a municipal and global movement, service and evolution oriented, multi-sector, combining and building harmony between real world and virtual world. Technology, institutional and human factors emerge as the fundamental components of a smart city: smart city is a center of higher education and smart workforce creativity and knowledge oriented leading to a learning dynamic environment [15].
Smart cities as intelligent, digital, wired, inclusive and democratic organizations and services platforms could have broader boundaries, from the urban dimension towards a more wide and global dimension. Smart cities should define measurable goals regarding to the aspects of intellectual capital creation, citizen participation, environmental sustainability and well being. Four main components (land, technology, citizens, government) tend to emerge through investigation of smart cities initiatives: the land as geographical area on which projects tend to focus; technology, ICTs and digital platforms in order to improve high quality of infrastructures, services and governance; the citizens and people which should both benefit of smart initiative and give a contribution by participation; citizens should behave as active players in the construction of smart cities initiatives; government in terms of public powers and bodies making strategic choices regarding the development of urban areas and territory and future quality of life of citizens living there [16].

4. Promoting ICT-enabled services for smart cities

Cities provide services ICTs-enabled infrastructures and digital platforms in order to support business and facilitate public life. Smart city is a concept future oriented integrating new technologies, social systems and ecological concerns relying on city governments, businesses and citizens embracing and using ICTs in order to reinforce and sustain the role of local communities in the service economy and to improve the quality of life within community. Developing a platform orientation for managing public governance helps to coordinate informatics policy and processes. The major function of platforms concern: integration and coordination by ensuring a single sign-on access to cross organizational service and enabling citizens to create their profiles as members of their community and as service users utilizing the user profile for interacting with public agencies by developing public sector resources for strengthening the communication and knowledge exchange citizen-to-citizen and community networks coherently with an user democracy perspective in building service processes and providing personalization within services solutions; providing an easy access to service processes by employing increasingly ubiquitous technologies; sharing for improving the opportunities of communication and contents creation and collaboration facilitated by the use of Web 2.0; creativity and innovativeness for generating new ideas and solutions for service delivery, policy problems about local development [3]. Building smart cities relies on designing platforms which offer citizens the opportunity to be connected to the governing bodies in order to provide contribution and inputs by enabling citizens to offer knowledge and experience in designing services infrastructures and utilities as to foster citizen participation and to improve quality of life within cities and urban environment [17].
Citizenship implies to build a relationship between citizens and government. There are different modes for managing citizenship by using ICTs. in the e-administration mode, citizens are interactive consumers and users of personalized services needed for administration of the public; e-government refers to the policy instrumentation aspect of city government; in the e-governance mode, citizens are active political agents participating in policy formulation and other political agenda in city governance; in the learning city citizens are actors and determinants of the rules for learning how to learn [18]. Lee and Lee [19] propose a typology of services that emphasize the citizen-centricity: the mode of technology as related to automate versus informative transformative refers to how ICTs can change the shape of services in terms of mechanization, complexity, divergence, routinization, knowledge, innovation and nature of service provision; the service purpose refers to what is the purpose of the service in terms of hedonic as service providing enjoyment or leisure versus utilitarian as functional service for urban management and satisfying public interest and goods; service authority that elucidates how citizens can be or not autonomous actors in managing and using the services in terms of voluntary services in which citizens as beneficiaries can select the time or contents of services versus mandatory services provided without regard of the will of citizens as users; the delivery mode which refers to the relationship between customers and service providers in terms of contact, customer involvement, responsiveness and customization implies the citizens can act as passive customers not necessarily giving a feedback or behave as interactive customers playing an active role in giving an input and waiting for reaction to process the service.

5. Conclusions

Technological advancements are leading cities as engines promoting urban and regional economic development to reinforce and rediscover both the importance and the relevance of citizenship by sustaining a smart cities approach and smart initiatives by developing services platforms. New interactive technologies and web 2.0 are driving cities to build new perspectives of social and economic growth and development within society by enabling citizen participation by making citizens full members of local communities as strategic path for managing and bridging citizen involvement and participation, sustaining a knowledge management orientation for better building digital and technological infrastructures for new forms and mechanisms of public governance. Developing a smart cities approach relies on investing in capabilities, employing human and technological resources for sustaining e-services platforms by involving the citizen to contribute and offer an input, to cooperate becoming an active co-producer of public services and providing knowledge for engendering public and social value creation. In the information era, new technologies open up to define a wider digital citizenship as the norms of behavior with regard to use of technology concerning standards of conduct or procedure, exchange of information, education to use technology, e-commerce, responsibility for actions and rights in a world digitally-enabled, physical well-being, security and self protection in using electronic devices and interacting with providers and other actors [20]. Cities planning smart initiatives and policies in order to improve services and quality of life of citizens contribute to reinforce and rediscover the meaning and role of citizenship as related to living the urban and local dimension as appropriate space and public area for engaging citizens and fostering participation and sustaining the involvement of people, groups and communities in debating and providing inputs to be included in discussion and consultation about urban and policy processes and for building the future of the cities and metropolitan areas.

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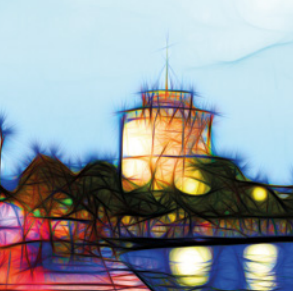

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COLLABORATIVE GOVERNANCE SCHEMES AND ONLINE PLATFORMS FOR SUCCESSFUL RIS3 STRATEGIES

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Smart Specialisation Strategies (RIS3 or S3) set priorities at national and regional level to build competitive advantage by developing and matching research and innovation own strengths with business needs. One of the steps of RIS3 methodology, is the governance scheme. This paper examines in parallel the challenges of collaborative governance schemes and online platforms as innovative ways for the successful RIS3 strategies. The collaborative governance schemes, besides a strong proposition for the RIS3, are considered a very interesting trend for modifying the perspective of citizens in politics. This tendency arises different theoretical questions about governance, democracy, inclusive society, democracy and the active participation of the citizens in any decision-making process. Additionally, online tools that support governance and policy makers are examined, aiming to identify characteristics and critical success factors that could be integrated in a new proposed governance supporting online tool. The relations of these two concepts are strongly interactive, the more we go digital the better collaboration we achieve, and the more we strengthen the co-governance schemes the better digital statistics are gathered for shaping the future trends.

Keywords
Collaborative, Governance, Platforms, Regions, Smart Specialisation

1. Introduction

Governance is considered as a sophisticated shared process management between actors all striving towards a common outcome. Governance refers to all processes of governing, whether undertaken by a government, market, or network, organization through laws or power. Bevir [1] gives a sort introduction on the evolution of the basic concepts and methodologies for the governance schemes in west countries. In the last decades, general trends such as administrative decentralization and supra national institutions have been identified in the governance of public policies in all European countries [2]:
These trends ought to lead societies to support development decisions in the middle of crisis of the traditional values, due to the globalization of the economy, and the worsening of the

state of the environment in the various industrialized countries. Thus, the assessment of governance trends become of great importance, to prevent economic failures and societal crisis.

Various studies on governance recognises the role of different elements affecting governance modes, as for example: a) the importance of socio-economic and structural factors, b) the importance of governing (public-private) networks, c) the power relationships between actors; hierarchical and non-hierarchical modes of coordination; from co- ordination to collaboration, d) change mechanisms, affecting both the regional structural dimensions and actors, etc.

Proposed RIS3 (Research and Innovation Strategies for Smart Specialisation) strategies, by the European Commission, have introduced a greater emphasis on governance amongst different actors (from a quadruple helix perspective), and it is these relationships that could influence the EDP -Entrepreneurial Process of Discovery] and could make a difference to an effective governance process [3,5].

It is interesting that, according to the picture created by aggregate national data, seems to be four main groups of European states with respect to Quality of Governance-QoG,: The top performers are mostly from the Scandinavian, Germanic and English speaking countries; a second group is largely formed by the Mediterranean countries, together with Estonia and Slovenia; the third group consists of most of the 'new' EU Member States plus, notably, Italy and Greece; and a fourth group includes the two newest Member States – Romania and Bulgaria.

To capture the most relevant sub-national variation in QoG possibly, we ~~can~~ focus on three public services that are often financed, administered or politically accounted for through sub-national authorities, either at regional, county or local level: education, healthcare and law enforcement.

Thus, a special attention should be given to a governance and exploitation model for the RIS3 in EU regions, with the target to reach participation and ownership to a highest possible degree. A study on the relation of the political governance scheme and the RIS3 governance scheme, for every region, should be of great interest for supporting a joint European competitive governance strategy.

2. RIS3 Governance Strategies

The RIS3 Platform was established in 2011 aiming to provide information, methodologies, expertise and advice to national and regional policy makers, as well as to promote mutual learning, trans-national co-operation and contribute to academic debates around the concept of smart specialisation. The Platform provides significant information on specific methodologies and tasks within the process of RIS3 strategy design and implementation; yet, it does not offer the tools themselves. [4]. The RIS3 methodology defines the steps (six steps) and type of tasks (18 tasks) each region should follow in order to perform a smart specialisation strategy. The RIS3 Guide [5], of May 2012 (final) addresses governance as a sophisticated form of shared process management between actors ~~all~~ striving towards a shared future outcome [6].

The RIS3 governance model is based on quadruple helix. In this context, the strong stakeholders in the Region are the Universities and Research Institutions, Chairs of Public authorities, the productive sector on primary sector (agriculture and veterinary) and tertiary

(tourism) with many professional chambers and institutions, Strong citizens' groups, which are supported by the Regions governance law, (Committee for public consultation).

Since many different actors are involved in the design and monitoring of a successful RIS3 strategy, a collaborative leadership scheme should be adopted, with hierarchies in decision-making flexible enough to let each actor to have a leading role in specific phases of RIS3 design. In order to tackle this potentially sophisticated scheme a **Steering Team, a Management Team and numerous Thematic Groups** are suggested in each Region.

The Steering Team, selected out of the leading organisations of each Helix group, initiates and monitors the process for updating the Scope of the RIS3, which should be in alignment with the Vision of the Region. The Local Management Team - LMT insists in a broad innovation strategy, putting effort on the innovation of services in the public and private sector and not only on technology and business activities. The LMT supports the regional on-line platform, monitors the Pilot Projects and is responsible for implementing the RIS project under the general guidance of the Steering Team. Each stakeholder participates to this team, while the technology leaders undertake the digital platform. The **thematic group**s generally reflect the specific priorities of the Region RIS3, and are compatible with the cluster networks existing in the region.

3. Case Studies

Four regions named Kentriki Makedonia - South Europe, Scotland - North Europe, Cyprus – Region Country, Basque –Successful Region have been selected for a detailed study of their RIS progress. The defined selection criteria were: the measured progress of the RIS implementation, the similarity of demographic and structural data and a geographic grouping of EU regions (North - South Europe, Region country, Successful or Not). In Tables 1 a comparative overview of the regions, in terms of economic is provided [7].

It seems that the populations have not been modified significantly during the examined years. The GDP variance for all the regions is increasing after 2000's except Kentriki Macedonia, which is entering into depression. Concerning Cyprus, which joined recently RIS, the GDP Annual Growth Rate averaged 2.09 percent from 1996 until 2016, reaching an all time high of 6.30 percent in the second quarter of 2000 and a record low of -6.60 percent in the second quarter of 2013 [8].

Table 1 Regional Demographic data, population, GDP, Unemployment 1990-2016

	Population		GDP		Unemployment	
	Early 1990 millions	2016 millions	Early 1990	2016	Early 1990	2016
Basque Country	2.1	2.2	10,000 USD	63615/2013	18,7%	13,9%
Scotland	5.08	5.35	129548/2000	196,617	10%	6%
Kentriki Macedonia	1.7	1.95	14,400	24571/2013	10.9%	19,5%
Cyprus	0. 671	0.862	15,105.21	16,503.7 (2013)	4,7%	7.7%

It is worth noticing that unemployment has decreased in most European countries through the RIS initiatives, but not in Greece and Cyprus. Unemployment in Greece is now a structural phenomenon of considerable dimensions and with a particular dynamic that tends to keep it going. According to Eurostat data, the unemployment rate in the EU-15 increased from 8.2% in 1991 to 10.9% in 1996 [9] [10].

Concerning the scientific infrastructure, the Basque country has more than one hundred thirty (130) relevant Institutes and Organisations, Scotland has more than twenty-three (23). Kentriki Macedonia more than fifteen (15) while Cyprus has more than twenty-five (25) academic and non-academic research organisations.

According to Innovation Scoreboard: a) the Basque Country shows relative strengths compared to the EU28 are in Tertiary education attainment, Innovative SMEs collaborating with others, and Employment in knowledge-intensive industries, b) Scotland shows relative strengths compared to the EU28 are in Tertiary education attainment, Sales of new product innovations, and Innovative SMEs collaborating with others, c) Kentriki Macedonia shows relative strengths compared to the EU28 are in Non-R&D innovation expenditures, SMEs with marketing or organisational innovations, and Innovative SMEs collaborating with others, and d) Cyprus Performance has improved in some dimensions; in particular in Open and excellent research systems (7.7%) and Human resources (7.6%). The indicator with the strongest growth is New doctorate graduates (23%) while Performance has worsened most in Economic effects and Firm investments.

The selected regions have indicated quite different RIS3 priorities based on their strengths. In Kentriki Macedonia, four champion sectors have been selected as pillars for the RIS3 strategy: the agro-food sector, the construction materials, the textile & clothing and the tourism sector [11].

The regional priorities of Scotland are given in [12] with an adequate historical overview and the main sectors included in RIS3 are: Food & Drink, Sustainable Tourism; Financial & Business Services, Creative; Industries, Energy; and Life Sciences

In Cyprus, the following sectors have been identified as the main priorities [13] Tourism; Energy; Agriculture –Food Industry; Construction industry; Transportation; and Health

The strategic priorities chosen by Basque as the three main areas of importance are: Biosciences – Health; Energy; and the Advanced Manufacturing. The governance concept for Scotland [14] is based on a clear hierarchical activities chain among the political organization and the involved parties. The Scottish Government is working closely with scientific and entrepreneurship advisory boards, as well as with any group of beneficiaries, for supporting the innovation activities in the country. A well-defined organization, the Scottish Executive (SE) is monitoring the Innovation process. The SE has a dual role in the SIS - Scottish Innovation Strategy, taking a leading role in policy formulation and development, and administering a number of schemes designed to enhance innovation in Scottish businesses. The Executive thus has a role in policy making and policy formulation and implementation, but also directly in support for innovation and R&D.

Basque country [15] has a long history defining economic development strategies over the past 35 years. The Basque Country has been at the forefront of the design and implementation of cluster policy since the early 1990s, when it embarked on a strategy to transform its economy in response to deep economic crisis and high levels of unemployment. In line with the underlying RIS3 philosophy of quadruple helix involvement in the identification of strategic priorities, the Basque Government decided to delegate the initial responsibility for

RIS3 coordination to the Department of Competitiveness and Economic Development (DCED) because it was closest to companies. A major decision has been the transition of Leadership to the Department of the President.
Kentriki Macedonia [16] has a long history in bottom-up and collaborative innovation policy planning with stakeholders' involvement, starting in 1994 with the Regional Technology Plan (RTP). Despite this long-term experience and acquaintance of stakeholders with participatory programming, in the current programming period regional innovation planning is centralised, designed and managed by the General Secretariat for Research and Technology - GSRT in Athens. A 15-member Joint Steering Committee of the RIS+/RISI+ programmes in Kentriki Macedonia was chaired by the Regional Administration and included 5 representatives from the national government, 2 from of the regional industrial associations, 2 from the regional chambers, 1 from the trade unions, 1 from the regional development agencies and 2 from the academic community. Its composition had a positive influence on the consensus building process and the applicability and wide dissemination of the programme and its objectives.
Cyprus was a late starter in launching a RIS3 process as it was only in February 2013, at a first national workshop, that the Commission (DG REGIO) presented to public the smart specialisation philosophy and external experts profiled the R&D and innovation situation and provided a review of potential sectors and activities. The RIS3 process was the responsibility of the Planning Bureau: the national authority for the implementation of EU Cohesion Policy and the managing authority for the operational programmes co-funded by the European Structural and Investment Funds (ESIF). It was implemented with the participation of four bodies/groups. The Governing Board (GB) is composed by representatives of stakeholders and constitutes the final decision forum and formation of a mutually accepted strategy and vision. The Monitoring Committee (MC) is a small flexible body that monitors the implementation of the study and takes "interim" decisions with regards to its evolution.

4. The Proposed Online S3 platform and its Governance module

A digital platform is defined as "a (technological) basis for delivering or aggregating services/content from service/content providers to end-users" [17]. Digital platforms are important to policy makers: The development of the platform economy puts pressure on the effectiveness of existing government policy for stimulating innovation and economic development and for safeguarding public interests. For these reasons, digital platforms currently are of particular interest to policy makers. They intend to understand the positive and negative impact these platforms may have on public interests in order to be able to determine if, how and when to intervene.

Some of the benefits of digital platforms are lower transactions costs and that enable users to express themselves and share information. On the other hand, there are also concerns raised in public debates about how platforms or users of digital platforms can and should comply with (existing) regulatory principles and frameworks.

A new digital, web based, environment is created in the ONLINE S3 project for the RIS3 strategies. The ONLINE S3 Platform aims to provide added value by offering online and freely available tools and services for each one of the proposed steps and tasks of the RIS3 methodology. The proposed web based environment is enriched with libraries, templates, score tables, and interactive tools for handling the huge amount of data needed during the

establishment and monitoring RIS3, as well as for covering the communication, consultation and collaborative leading activities for a successful strategy. Circles of social networks will be developed for supporting the participation to open forums, consultation forums, archives of documents. Specific rights will be delivered to participants. The digital platform needs, though, its own governance and assessment, based on well-defined criteria for digital tools. Integrated to this web based environment will be an online tool that will support the governance dimension of the RIS3.

Science and technology interact with society in a complex way and their "effects" are often neither immediate nor direct, but of second or third order and occur after a substantial time delay [18]. Policy-makers cannot afford to wait until situations are clarified and until the effects are evident before they take decisions. Though tomorrow's developments are uncertain they originate in conditions established today. Hence, there is an important need for policymakers to scope the impacts of science and technology and how they may develop [19]. Moreover, the growing knowledge-intensity, the pace of technological and societal change and the increasingly distributed and networked character of the economy and of governance processes cannot be explored using only technology-oriented future studies [20]; a more comprehensive approach is required.

Social media and online collaboration platforms today offer a number of advantages for fostering collective action over its "off-line" variants, including the fact that it is much easier to: discover and attract members with shared interests; exchange information; make group decisions at a larger scale; integrate individual contributions; supervise a group with less need for hierarchy; and manage group logistics due to elimination of time and space constraints. According to Dennis Linders, [21] these advantages can have an impact the government-citizen relationship in different ways. The advantages are in the relationships of Citizens to Government (C2G); Governments to Citizens (G2C) and Citizen to Citizen (C2C). The effects of these platforms can be identified in the execution of governments tasks and delivery of services consists of three groupings: the design of the initiatives, services and actions; the day to day execution and finally the monitoring and evaluation of the results.

Governments can use platforms in the relationship of C2G to adopt new models and service types used by innovative groups of citizens and entrepreneurs to address their main functions. In the second relation type G2C the use of web platforms can be used to service design so that governments inform & nudge their citizens to support their personal decisions. Tim O' Reilly argues [22] that the Internet enables government to become "a stronger part of the social ecosystem".

The critical success factors of web platforms the support governmental functions can be inherited by government's roles and responsibilities. Governments need to perform the following roles: as framer; sponsor; mobilizer; monitor and provider of last resort. The web platforms need to support in innovative ways the execution of the above roles.

For digital platforms, important sources of market power are the direct and indirect network effects. Other characteristics that influence market power are economies of scale and the level of horizontal and vertical integration. An important characteristic in the analysis of digital platforms is the way the platform exploits network effects. Due to network effects, a platform becomes more attractive to consumers and to other users of the platform (such as advertisers or developers) if the total number of consumers grows.

The relation between the platform characteristics and public interests Relationship between platform characteristics and "competition and innovation". The first public interest in the framework is 'competition and innovation'.

Competition refers to interaction among market players that is driven by rivalry in which every actor tries to maximise its long-run profits.

Based on the Figure 1 [17] we can describe the RIS3 digital platform as a a) distributor and social network, b) with direct and indirect effects and horizontal integration, c) for competition and innovation and d) enforcing an existing network with new instruments.

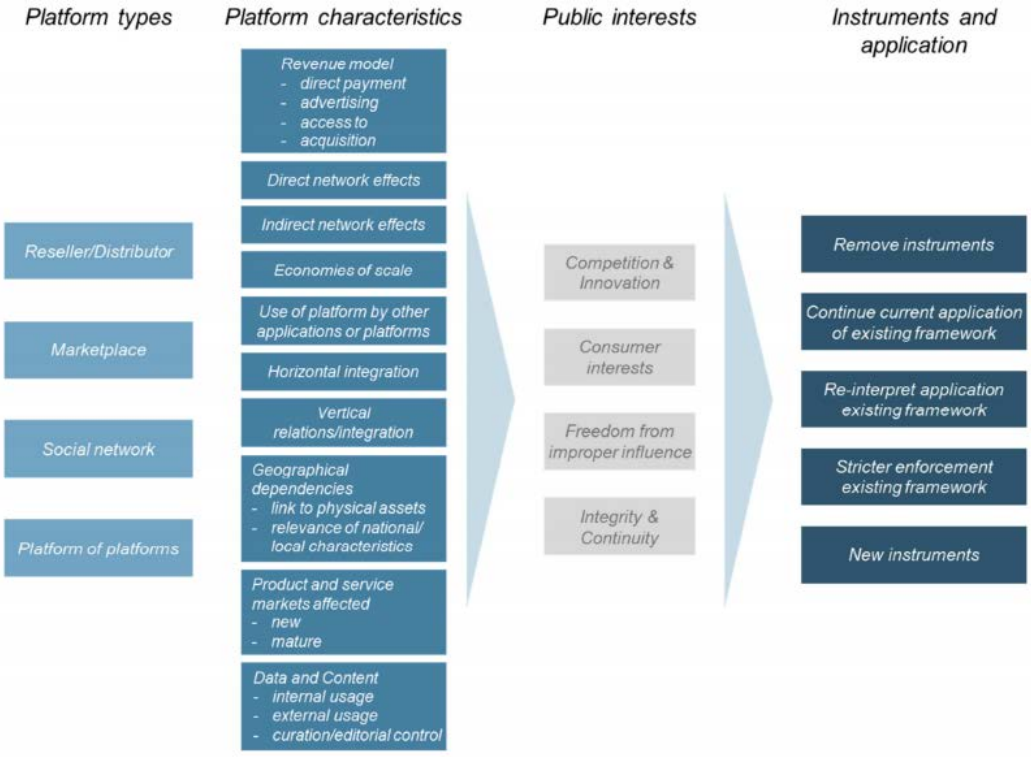

Figure 1 The analytical framework for digital platforms

The ONLINE S3 Platform for Smart Specialisation Policy Advice is an open environment where all the other systems and applications can cooperate. It has typical frontend features such as user authentication, administration management, and all data management features. It offers online services, tools and applications which support the design and implementation of RIS3. These online services complement the existing S3 Platform of the Joint Research Centre of the European Commission.

5. Conclusions and Further Research

Based on the examined cases, governance is considered as a critical factor for a successful implementation of the RIS3. Given emphasis to the innovation evolution of the selected areas a firm conclusion on the importance of the governance framework for a successful RIS

strategy could be derived. Various reports have underlined that the major problem is not the lack of an appropriate policy-mix but the implementation and coordination of research and innovation policies.
The Basque country decided, at a very early stage, that a distributed but well-controlled governance scheme (through the President Department) will lead to measured and concrete results, and that was proved to be a successful decision. In other regions, especially with low scores on Innovation, a looser governance scheme, has been adopted that proved to be not able to support a definite development progress. (Kentriki Makedonia).
In addition, a peer review country report for Slovenia produced by ERAC, 2010 [23] is stated that "the future governance structure will be a key element in delivering an efficient national innovation system with a clear political direction and with stronger connections between the "innovation actors" working towards common and not competing aims".
Thus, a RIS3 European centralised governance scheme, will enhance common concepts for all regions and support the weak regions to reach faster their goals. Further, the proposed ONLINE S3 set of tools and applications, that will be hosted under the ONLINE S3 Platform for Smart Specialisation Policy Advice can help the flexibility, applicability and transparency of all the procedures.
Further research is proposed to identify the adoption of the new platform not only by the regional authorities, but also by the society, since RIS3 is a bottom up participatory strategy.

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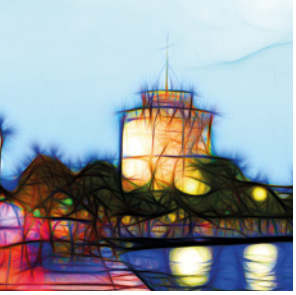

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ACADEMIC AND INDUSTRY COLLABORATION LEADING TO THE PILOT PRODUCTION OF INNOVATIVE, NUTRITIONAL FOOD PRODUCTS

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New product development (NPD)is vital to the food industry because: 1) customer's needs and wants are constantly changing, 2) trade customers want new products, 3) technical developments, 4) legislation, 5) competition, and 6) shortened product life-cycles. As NPD can be a time and resource consuming process companies and research centers are constantly investigating for structured processes which will enable cost–effective and timely product launches. A new, innovative open innovation (OI) model of collaboration process between university and industry focusing on food new product development (NPD) has been developed and implemented successfully over the last 8 years. In 2011, in view of the student's eco-food competition "ecotrophelia" initiated in Greece by the Federation of Hellenic Food Industries (SEVT), we developed an and launched a campaign in order to recruit Greek food companies and develop together novel foods for the competition. The initiative was successful and productive thus is continued annually ever since. Overall, *18 innovative foods* have been developed and produced at the pilot phase by 18 groups of students of *the Department of Food Science and Nutrition (University of The Aegean)*, in collaboration with *10 Greek food companies.*

Keywords

Academic–Industry Collaboration, New Product Development, Open Innovation

1. Introduction

InInnovation is an important tool for companies to adjust to competition and changes in the market [1], and the importance of innovation is justified [2], by the action of conjoined and critical forces such as intense international competition, market sophistication and quick technological changes. In this way, although the competitive advantages can be related to certain factors such as company size and larger resources, there is a growing predominance of companies flexible enough to bring together knowledge and technological capabilities to develop new products. Product development process is defined [3] as ''the entire set of activities required to bring a new concept to a state of "market readiness''. Ulrich and Eppinger [4] mention that ''product development is the set of activities beginning with the perception of a market opportunity and ending in the production, sale, and *delivery of a product''.* Clark and Wheelwright [5] also interpret new product development as a process in which an organization transforms market opportunities and technical possibilities into *the manufacturing of a commercial product.* The adoption of a project methodology is essential,

since it helps the designers to rely on a trustworthy model for their work accomplishment and, despite the developer's desire to design for customers (meeting demanded attributes such as appearance, design, durability, etc.), there must also be a concern to design for the manufacturer (simple manufacture, usage of few resources, etc.), for the sales team (easy transport and stocking, etc.), among others [6].

Large enterprises have advantages such as renowned brands, earnings in scale of mass-production and a greater influence on contract development both with customers and suppliers. However, for the development of products and technologies ancillary to the core business, large firms tend to deploy the assistance of universities. In the US, firms, tend to use the help of universities in products in the pre-competitive stage. This practice is important for protecting the intellectual assets associated with the product and technology. Large firms often use universities as a forum for exploring ideas not only with the faculty and students, but also with others in the industry. In this respect, universities help develop social capital for the industry that facilitates technology transfer and innovation [7].

Comparatively to large companies, SMEs tend to present greater flexibility, for they are able to mobilize themselves to meet market demands in a shorter time than large companies [8]. SMEs face greater difficulties in aggregating innovations especially product innovations. Acquiring knowledge and skills through external collaboration has become for SMEs an effective and efficient way towards the success of innovations. Small firms, interact with universities for the development of technology related to their core and ancillary business areas. Small firms generally lack munificence of resources and so try to make the best utilization of any available resources.

Universities differ in terms of their capabilities and strategies [9]. Large universities with a national reputation of high caliber, such as MIT, Carnegie Mellon or Stanford, can be better suited to add to the social capital of the industry. Smaller and less known universities become more suited as problem solvers. Cultural difference between universities and firms is an important issue that generates obstacles in their collaborative efforts. The development of products need to be tightly controlled and monitored more closely than universities are accustomed to. Universities are potentially great resources for corporations for developing new technology and products. In recent years, there have been more reasons for these two types of organizations to collaborate for mutual benefit. In a dynamic global economy, this has become critically important as evidenced by the experience in Finland. Contract research, by a research center or a professor, is often a vehicle for collaboration between university and a firm. In Finland, TEKES, the Finnish Technology Development Agency promotes the industrial collaboration by requiring that all of its projects and products be collaborative. The policy implemented by TEKES not only promotes interaction between a firm and a university, but also decentralizes the control and monitoring of the projects and the products developed.

2. Literature review and Research focus

Innovation is the application of ideas, technology and processes in new ways to gain a competitive advantage and create value, and it plays a vital role in all facets of modern life [10]. Innovations can become commodities at an unprecedented speed and consequently, continuous effort is required. The mantra "innovate or die" is no longer sufficient. Open innovation (OI) and innovation partnerships could be the leitmotif for today's companies. OI has been defined as "a paradigm that assumes firms can and should use external ideas as

well as internal ideas, and internal and external paths to market, as the firms look to advance their technology" [11].

OI has seen a massive expansion in recent years [12]. The goal sets back in 2000 by Proctor & Gamble for their OI model of "Connect + Develop"—that 50% of innovation be acquired from outside the company—has made significant inroads [13]. OI has spread and mushroomed in many industries (e.g. pharmaceuticals, chemicals, biotechnology, drugs, software) and the large food industry has followed too [10, 14]. Despite OI's widespread applications, small and medium-size enterprises (SMEs) and others operating in traditional sectors are struggling with its implementation due to their relatively low level of absorptive capacity, and management challenges which are perceived as unattainable [15]. The untapped potential and full adaptation of OI is particularly relevant for the EU Food and Drink (F&D)—the EU's largest manufacturing sector, which employs some 4.4 million people generating 14% of the total manufacturing jobs. The SMEs are especially struggling with OI implementation [16, 17], and although they comprise 99.1% of the total 310,000 companies, they generate only 49% of the F&D turnover. This topic has attracted much attention and is under deliberation by various EU bodies [10]. Collaboration is a key piston of the OI, in the engine that drives economic growth and new product development. Value creation is the ultimate goal of any partnership: without it, the concept holds no real merit for the partners. Despite the great potential, significant inroads still need to be made in the collaboration between industry and academia in order to develop an OI value creation partnership. . Academia's long history of working in isolation, its different value chains and a general misunderstanding between parties furnish a partial explanation for their "staying at arm's length." So-called ethical conflicts threaten academia by distracting it from teaching and basic research, undermining collegiality, encouraging secrecy, preventing or delaying publication, and devaluing the human component [18]. Traditional collaborative conflicts between academia and industry include confidentiality, publishing, IP rights and ownership. The mindsets and research foci of the two institutions are also quite different: while university is mainly focused on fundamental research (R), industry works primarily on development (D), with a typical ratio of D to R in the food industry exceeding 4:1. Concerns about potential conflicts of interest arise when members of the academic community interact with industry (e.g., consultants, scientific advisors). These concerns are alarming, but collaboration principles should serve as a platform for promoting the development of mutually benefit relationships. Other factors, such as culture and funding, have also been identified as significant constraints stifling fruitful collaboration.

Another basic difference between academia and industry is their value chain. While industry is driven mainly by its bottom line and gaining full IP rights, academia is primarily motivated by the pursuit of basic science and knowledge dissemination, student education, publications and often also full IP rights. OI proliferation has proven that academic freedom is not affected, and that biased company-sponsored research is quite rare. It is generally accepted, especially by EU countries, that university innovations have an underutilized and unrealized potential that continues to lie dormant. Consequently, sustained efforts to advance university innovations are needed. Building bridges between university researchers and businesses is critical for knowledge transfer—this is no longer an option but a must, and collaboration can pave the way. However, even OI focuses on quite narrowly defined, short-term transactions. The latter miss the opportunity to build much longer, trust-based relationships that can be used to engage diverse teams in tackling more diffuse and broadly framed challenges [19]. This issue may be due to the fact that OI has only recently seen broad utilization and it should continue to adapt a larger scope for driving collaborations between academia and industry.

Toward implementing significant changes in academia-industry collaborations and the pursuit of innovation, collaborative principles should be expanded and an overarching common vision should be developed. This game-changing vision should be based on new shaping strategies (i.e., reshaping broader markets, industries, or social arenas [19]) which will be expanded to include academia as well. The new vision and shaping strategies should address the broad scope of innovation, including product innovation and furnish industry and academia with opportunities to seek improved means and tools to develop platforms, and new products that will maximize mutual efforts, enable participation, promote learning and societal responsibility, and lead to the creation of an innovation ecosystem. Academia should play a paramount proactive role in the conceptualization, deliberations and design of this new vision, and should contribute to its content leading to innovation and new product development for the mutual benefit of the academic and business sector.

3. Research methodology

The road from a discovery stemming from basic research to a commercial product, process or service is long and rife with significant obstacles. Typically, a funding gap or "valley of death" (VoD) exists between basic research and commercialization [20]. To simplify the concept of VoD, the innovation sequence can be typically depicted in three stages: stage 1 is basic research, also termed pre new-product development (NPD), providing what is known as the "front end" (or "fuzzy front end") of innovation; stage 2 includes the transformation from basic research outcome into a potentially marketable product/service; stage 3 is commercialization and diffusion of a new product/service, translating projects into economic value.
In this paper we have developed an OI model of collaboration between Greek food SMEs and the Food Science & Nutrition Department, University of The Aegean, Greece, fulfilling the first two of the above mentioned three innovation sequence stages leading to food NPD. The OI partnership described here consists of three main groups of people: students, academic staff, and industry personnel. Managing the relationships between the three partners (students, academic staff, and industry representatives) is vital to a successful collaboration and end product outcome. The team members of the OI program are structured into three types of members: core, extended and ad hoc teams (Table 1).

Table 1 Team Members for Open Innovation and NPD

Team	Function and Frequency Of meetings	Members
Core	Meet frequently (weekly) to discuss and guide students, review their work and design weekly plans	Students (Food Science and Nutrition undergraduates) Academic staff (supervisor)
Extended	Meet monthly and at the four scheduled review meetings, to monitor progress and give feedback	Company's representatives
Ad hoc	Invited when required during the project	Academic course coordinator External experts

The core team includes the students and their supervisor (i.e. academic staff from the Department of Food Science & Nutrition). The extended team members include a

representative from the client food company (usually a project manager, design engineer, or the managing director of the small company himself) and other company's practitioners with an engineering or a business development background. The ad hoc team members include the academic course coordinator (the person who has practically developed, and managed throughout the years the overall project) and other specialists and external experts who may be contacted whenever required during the development of the process. This structure does not have to be rigid, and is flexible fulfilling the needs and requirements of each project every time. It is efficient however based on the successful outcome with pilot NPD all these years. The core team meets more often and is more heavily involved than the other sets of members.

The key question of how best to make the OI collaboration work successfully between university and industry is addressed here. The framework described here represents an OI partnership in product development between University of The Aegean and food industry partners (Figure 1).

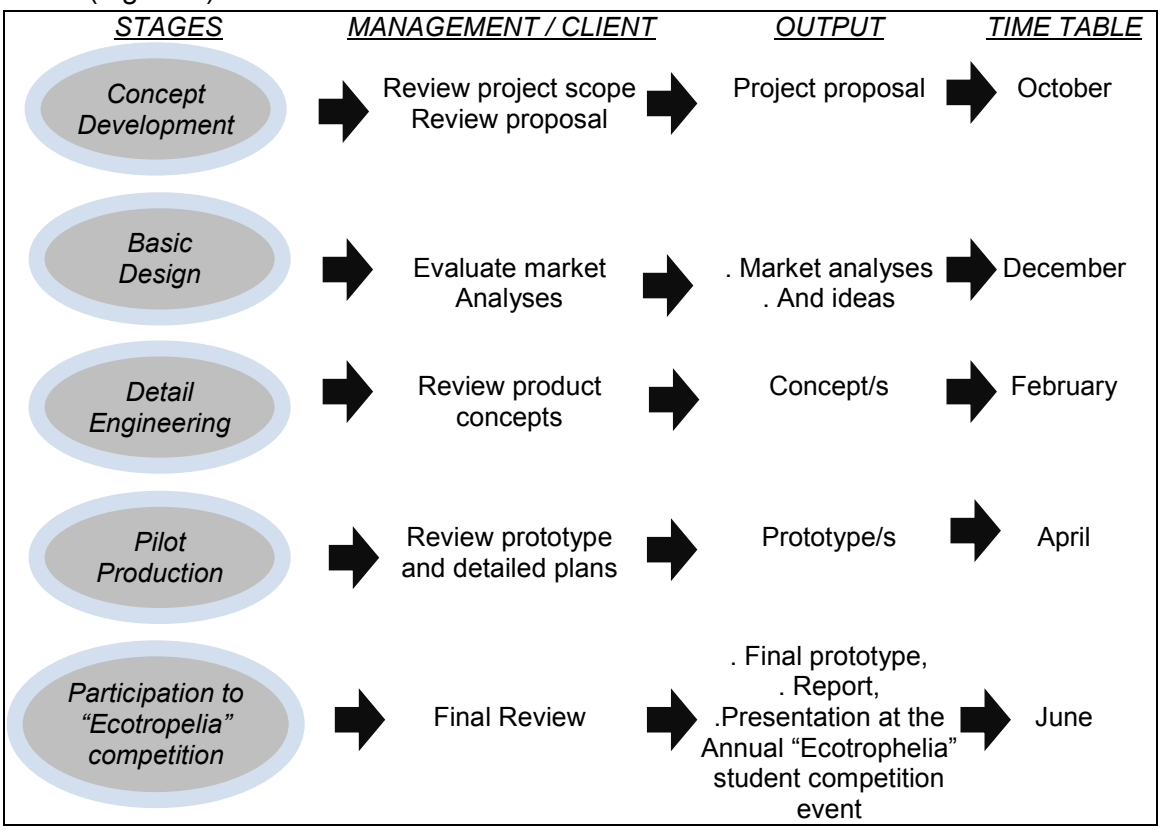

Figure 1 Product Development process

It is consisted of 5 stages implemented within a 9 month period from October to June. The management (university mainly) / client (food SME mainly) basic role, the expected outputs, and the time table for each stage are shown in Figure 1. Through this overall process the students (as a group for each project) are participating in the student "ecotrophelia" competition for new innovative food products. This is a European competition organized in Greece by the Federation of Hellenic Food Industries (SEVT). The competition organizes its final event in June every year were the students present their pilot produced products and the best products are awarded (end of the project).

Companies are informed of project time constraints due to students undertaking other courses at the university, but occasionally business pressures demand a quick response. Students are made aware of these real-world pressures of time and have risen to these challenges very well, and it has been to their advantage. It is mutually beneficial when all three parties meet at critical times during the process, as per the framework schedule's review milestones. It is important for companies to set aside these dates and times so that they can be involved in the progress and direction of the project.
A holistic, multidisciplinary approach to the process of product development allows for a range of perspectives to be explored, concurrently whenever possible. It allows for client reviews and input at key stages, checking that milestones have been reached as specified, and that the schedule is on target. This framework gives clients confidence that they can see the direction in which a project is heading at key points during development, and can provide input or steer it in a way that suits their objectives.

4. Results

The validity of the proposed OI academic – food industry model is based on its successful implementation over the last 8 years, since 2011. Over these years 18 new, innovative food products have been developed by the undergraduate students of the Food Science and Nutrition department, in collaboration with 10 Greek food SMEs, produced in pilot phase, and presented at the Ecotrophelia competition. The products per year were 1 (in 2011), 3 (in 2012), 5 (in 2013), 3 (in 2014), 3 (in 2015), and 3 (in 2016). Three products per year seems to be the optimum number that the current capacity of the OI university – industry model can successfully manage which includes the participation of 12 students (4 students per project). The ten companies which have participated so far in the process are: APIVITA S.A. (4 times), MEDITTERA S.A. (3 times), GIOTIS S.A. (3 times), UNISMACK (2 times), OLYMPOS (1 time), PELOPAC (1 time), PAYLIDIS (1 time), CHIPITA (1 time), STERGIOY (1 time), XRYSAFIS (1 time). The fact that most companies have participated more than once, proves that the model is very useful for the food industry. It is in fact an excellent brain storming process which strengthens company's innovation capacity, dynamism, and ability for new product development regarding of its size and sub-sector of activity. Each year one of the produced products receives an award among the participating products in the ecotrophelia competition (more than 15 products participate annually). This is another end result which proves the quality of the produced products, and the liability of the applied OI model. This year, three more products are at the developing stage, in collaboration with three SMEs, and will be presented at the ecotrophelia completion 2017 this June.
The selection of suitable products projects was critical to successful project outcomes. It is vitally important that the project has the potential to meet university's requirements, the requirements of the industry partner, the capabilities of the students, and the requirements of the ecotrophelia competition. The university's / competition's requirements were made clear to industry partner each time in terms of time duration (of nine months), complexity level of the project selected, and students' skills, knowledge, and capacity. Projects have been selected based on the following:

- A good fit with the students' knowledge and skill levels (typical examples are shared with industry)
- A fit with the timeline, allowing the opportunity to go through all of the major stages of development

■ The scope of the project must be sufficiently wide to allow student creativity, and at the same time focused on a clear customers' nutritional need
■ A clear definition of company requirements, expectations, and innovation strategy
■ Opportunity for stakeholder input and application to design
■ Sufficient opportunity to consider commercialization options as part of the project - including economic, marketing, and manufacturing plans

The type of the 18 products covers a variety of different kinds of foods from bakery to snacks, from soft drinks to milk, and from olives to sweets. All of them exhibit special nutrition characteristics based on their specific healthy ingredients (most of them of Greek, local origin). At the same time these products combined excellent organoleptic properties, attractive innovative packaging and appealing English names. The Greek originality of the main ingredients used for each product promoted them as unique Greek "traditional style" foods part of the existing traditional Mediterranean diet. Finally, the economics of each product calculated in details from the cost of raw materials, of production, of marketing and distribution, including margin profit provided competitive retail prices compared with the rest of the antagonistic products in the market in order to be able to enter the market with major advantages. Microbiology tests, expiration dates estimations, HACCP production processes requirements, and an overall business plan are among the accumulated data for each product gathered and presented to the ecotrophelia experts' panel who conducted the competition and decided the awards each year.

5. Conclusions

Industry can benefit from collaborating with universities in Open Innovation, and especially small and medium enterprises that typically may not have all of the resources required for complex new product development [21]. A vast number of valuable new ideas often never take off due to lack of resources and time [22]. The proposed model in this paper conveys the mutual benefits of OI between universities and food industry and offers a successful framework structure of operation. The framework is versatile, allows for scheduled review meetings during development, and displays key milestones visually. This collaborative program brings the food sector into close contact with the university community. This partnership is not well developed in many countries, despite being considered critical by many experts for the development of an innovation ecosystem. Industry and universities must work together to contribute to global and humanitarian development, and solve problems that are of urgent need to society and have a global impact [22]. As the number of such partnerships increases over time, there can be more sharing of resources and knowledge across partners around the world. It has been found on a number of occasions that a solution or idea in one industry can spark a new application in another industry [23]. In the future we will see more such collaborations due to the advantages they bring, resulting in new innovation ecosystems. More and more insulated organizations should transform into open systems with joint teams and innovative people. New forms of innovation partnerships sharing may emerge in the future as more OIs take place. Why reinvent the wheel when one can access knowledge anywhere in the world rapidly through modern communication technologies, and speed up their own product development via open Innovation?

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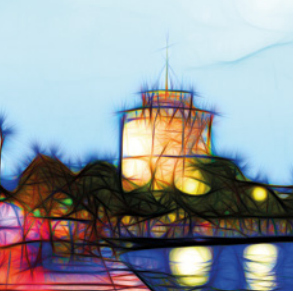

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RISK MANAGEMENT FRAMEWORK FOR IT-CENTRIC MICRO AND SMALL COMPANIES WITH MODEL FOR RISK ASSESSMENT

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There are many approaches to risk management, and the practice shows that they are not suitable for IT-centric Micro Small and Medium Enterprises (MSME), but more targeted to large and complex organizations. At the same time, the existing approaches in isolation are aimed at a particular type of risk, not taking into account that MSMEs need a more integrated approach that they could apply to various types of risks they are exposed and in order to obtain adequate information for making quality decisions for managing the companies. Based on field research and direct work with companies, the issues and challenges identified for the IT-centric micro and small companies are: need for encompassing various risks, limited resources for risk management, and necessity for usable and comprehensive framework. The new framework covers people, policy, methodology and process, and tools. The method for assessment of risks is a hybrid one, as it was shown that MSME couldn't sustain a fully quantitative approach and as managers feel more confident with qualitative estimates.

Keywords

ISO31000, IT-centric companies, Micro Small and Medium Enterprises (MSME), Risk Assessment, Risk Management Framework

1. Introduction

In the 21st century we are witnessing the development of a knowledge society where information has enormous significance, and as well extremely rapid development of information technologies and their penetration into every aspect of our life. These trends create new risks that directly threaten the work of organizations, specifically micro, small and medium IT-centric companies (MSME). While there are many approaches to risk management, the practice from the experience in the 20+ organization where we have implemented risk management shows that they are not suitable for these MSMEs, but more targeted to large and complex organizations. At the same time, the existing approaches in isolation are aimed at a particular type of risk, not taking into account that MSMEs need a more integrated approach that they could apply to various types of risks they are exposed

and in order to obtain adequate information for making quality decisions for managing the companies. Identified problems include lack of adequate integrated and tailored methodology for managing risks related and lack of adequate model for the assessment / valuation of the risks.
In this paper we review the risk management concepts, specifically the risk management frameworks, and based on them we propose a new risk management framework tailored for IT-centric micro and small companies. The proposed framework for risk management is a summary of various elements from the existing frameworks, but adapted to the specifics of the IT-centric companies and deals with the identified challenges for the implementation of risk management frameworks. The research is based on the direct experience of the leading author in the last 7 years with over 20 micro and small companies that are heavily IT-centric in their operations, and on survey conducted in early 2017.
This paper is structured in several segments. In Chapter 2, an overview of risk and risk management is provided together with reviews of the risk management frameworks and standards. In the following chapter, the finding from the field research are presented, while in the Chapter 4, the proposed risk management framework is presented.

2. Overview of Risk, Risk Management and Risk Management Frameworks

The main concepts of risks management in IT-centric micro and small companies are divided into 2 groups: (i) definition of risk, types of risks and risk management, and (ii) risk management frameworks and standards.
Based on the International standard for Risk Management – ISO31000, risk is defined as: “effect of uncertainty on objectives”[1], where the uncertainties include events (which may or not happen) and uncertainties caused by ambiguity or a lack of information, while the objectives can have different aspects (health and safety, financial, IT, environmental) and can apply at different levels (such as strategic, organizational, project, process). It also includes both negative and positive impacts on objectives. The risk is often expresses as a combination of the consequences of an event and the associated likelihood of occurrence. As we discuss risks management frameworks for IT-centric micro and small companies, the main focus are the organizational risks. There are various types of organizational risks such as program management risk, investment risk, budgetary risk, legal liability risk, safety risk, inventory risk, supply chain risk, and security risk. [2]
For the needs of the management of the IT-centric micro and small companies, all these risks could not be approached independently, and an integrated approach is necessary. This approach should be focused on the main drivers in the company, like the continual operations thru IT operation and known business processes so that the employees can understand what they should do. The reliance on IT as well puts the information security risks among the top as well. For the purposes of the research questions, we make the assumption that the management of these IT-centric micro and small companies deals with the legal and financial risks intuitively, and that they are not necessary to be included in the integrated risk management framework and approach of the company.
Having said that, for the purposes of the paper, we will look into the IT risk, information security risk and operational risk, which are respectively defined as:

- IT risk—that is the business risk associated with the use, ownership, operation, involvement, influence and adoption of IT within an enterprise. [3]
- Information security risk—that is, the risk associated with the operation and use of information systems that support the missions and business functions of their organizations.[2]
- Operational risk - The most common definition, first published in The Next Frontier and also adopted in recent operational risk documents issued by the Basel Committee [4], is that "Operational risk is the direct or indirect loss resulting from inadequate or failed internal processes, people and systems, or from external events."

The next concept to be introduced is the risk management. ISO31000[1] defines the risk management very broadly as the coordinated activities to direct and control an organization with regards to risk. Other institutions have a more precise definition, as described for example in NIST special publication SP800-39 [2], where risk management is defined as a comprehensive process that requires organizations to:

- frame risk (i.e. establish the context for risk-based decisions);
- assess risk;
- respond to risk once determined; and
- monitor risk on an ongoing basis using effective organizational communications and a feedback loop for continuous improvement in the risk-related activities of organizations.

Risk management is carried out as a holistic, organization-wide activity that addresses risk from the strategic level to the tactical level, ensuring that risk based decision making is integrated into every aspect of the organization.

With the development of risk management as an organizational discipline, a more defined concept evolved, named Enterprise Risk Management (ERM). There are many definitions of ERM, but a representative one is from the COSO framework: "Enterprise risk management is a process, effected by an entity's board of directors, management and other personnel, applied in strategy setting and across the enterprise, designed to identify potential events that may affect the entity, and manage risk to be within its risk appetite, to provide reasonable assurance regarding the achievement of entity objectives" [5].

After setting the stage with the definition of the concept, lets look at the available risk management frameworks. Nowadays, there are several types of risk management methodologies, some of them issued by national and international organizations such as ISO, NIST, AS/NZS, BSI, others issued by professional organizations such as ISACA or COSO, and the rest presented by research projects. Each of these methods has been developed to meet a particular need so they have a vast scope of application, structure and steps. The common goal of these methods is to enable organizations to conduct risk assessment exercises and then effectively manage the risks by minimizing them to an acceptable level [6].

Vorster and Labuschagne in their work[7] go even deeper in the analysis focusing solely on the methodologies for information security risk analysis and define a framework for comparing them. The objective of their framework is to assist the organization in the selection process o the most suitable methodology and/or framework. The elements than they are taking into consideration include:

- Whether risk analysis is done on single assets or groups of assets
- Where in the methodology risk analysis is done
- The people involved in the risk analysis

- The main formulas used
- Whether the results of the methodology are relative or absolute

Some of these criteria are tightly related to the risk management considerations we have identified in the following section for the IT-centric micro and small companies.

3. Findings from the field research of IT-centric MSME

In early 2017, a field survey on risk management experiences, perceptions and preferences was conducted among professionals from IT centric organization from various countries. 157 responses were collected from professionals coming from organizations in IT services, IT outsourcing, Business Process Outsourcing, Telecoms, Banking, government institutions, etc. Based on the results, there is an equal representation from the categories, coming to a 74% of respondents within the main target group of the research i.e. micro, small and medium (MSME) companies.

Out of the responses, 24% were not aware which methodology (if any) was used for the risk assessment, while 22,9% did not use any formal methodology. Of those who used some formal methodology, most represented is ISO27001/ISO27005 i.e. the information security risk assessment methodology. 17% of the responses named the international standard for risk management ISO31000 as the used methodology. Looking at the entire population of respondents, the top identified options for the scope of risk management are: operational risks, strategic risks and IT/security risks. The spread is shown on the following figure

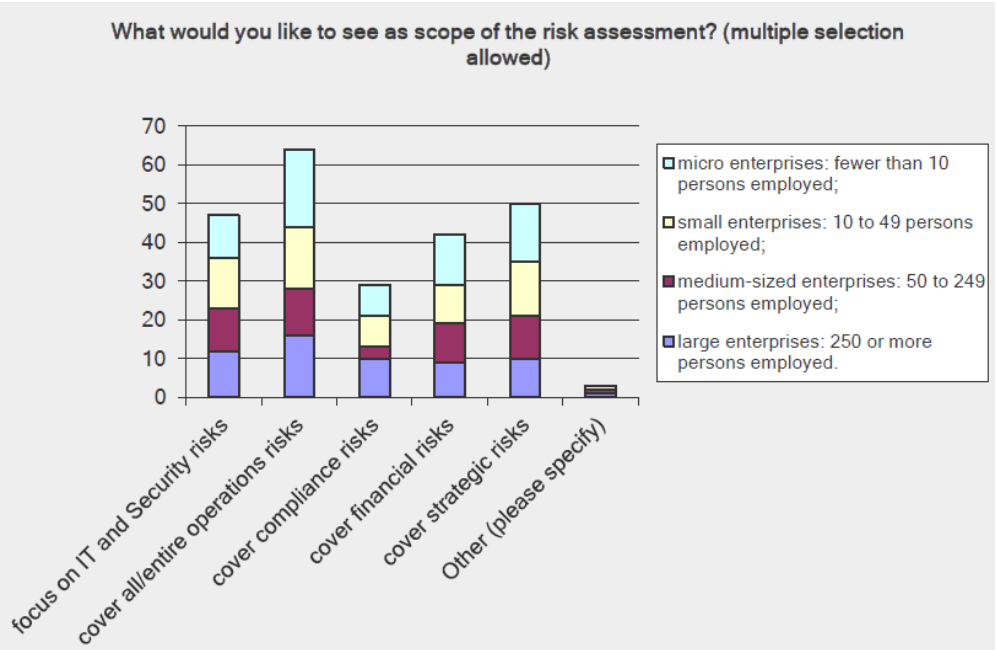
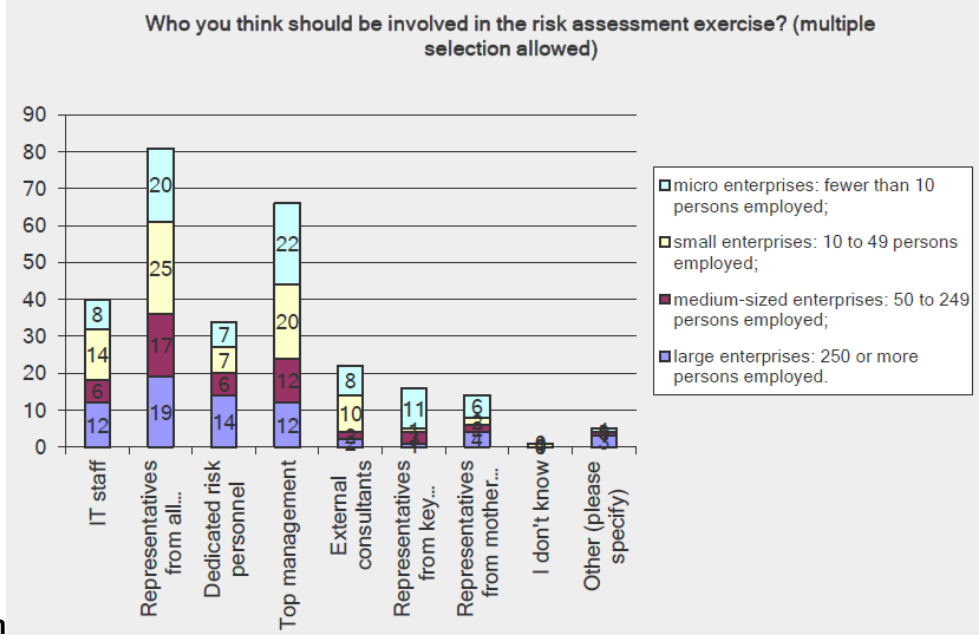


Figure 1 Scope of risk assessment

In majority of the surveyed organizations, the risk assessment teams were small i.e. 2-4 team members, while in micro companies, sometime it is a one-man activity. When asked about

the composition of the team, the favored options were: representatives from all departments, top management and IT staff. The spead is shown on the following figure



team

Figure 2 Composition of risk

As for the modality for doing risk assessment, the top 3 choices were identified as: facilitated group workshop, delegated to various individuals using a computer cool and risk team with subsequent consultation. When asked about the valuation models, the preferred one was a combined qualitative/quantitative model, with pure quantitative being the least represented model. The identified priority of the modality for implementation is shown on the following diagram

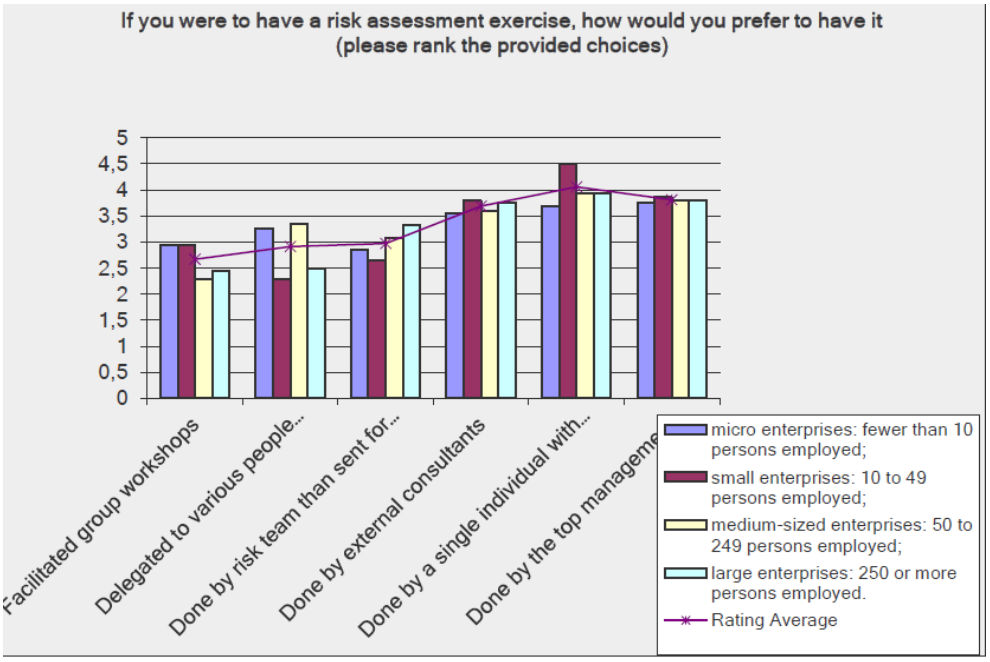


Figure 3 Modality for implementation of risk exercise

Finally, considering the duration and frequency of the risk assessments, the majority preferred 2-4 week timeframes for risk assessment exercises and an annual review frequency.

Based on all these findings, and the direct experiences of implementing risk management in over 20 IT-centric MSME in South-east Europe we have identified the influencing factor on the risk management framework that is presented in the following section.

4. Proposed Risk Management Framework

The risk assessment model is based on the findings from the academic state-of-the-art, but tailored to the realities of the MSMEs as identified from the field survey and in-company work. The feasibility and validity of the proposed framework and model was checked through direct interviews with managers of MSME.

As defined in the ISO31000:2009 Risk Management Standard [1], a risk management framework is a set of components that provide the foundations and organizational arrangements for designing, implementing, monitoring, reviewing and continually improving risk management in the organization.

In order to provide a usable framework which covers all the key risks, and which takes into consideration the specifics of the IT-centric micro and small company, we took the common elements of the analysed frameworks and created a customized framework. This new framework reflects the findings from the conducted survey on risk management practices in IT-centric MSMEs.

4.1. People

The People component of this framework deals with the Risk management team and the Risk management officer. It is described first, as it reflects the facts that risk management is people intensive process and the people are crucial for the successful implementation and maintenance of risk management in the organization.
The people element is crucial as risks management can not be fully automatized, and human decision making is necessary. Trained team, adequate understating of the risk culture and right mix of representatives is key for successful and value adding risk assessment exercise.
The main aspects are:

- Risk management team – to include the representatives from the main processes or units in the company, as well as the management team. Optimal number of representatives is 5 to 7.
- Risk management officer – a responsible person in the company, the owner, and managing director or other person from the management team in the forefront of the activities for risk management.

4.2. Policy

The risk management policy is a simple but straightforward document summarizing the intent and the approach for risk management. As main elements, the policy includes:

- Scope and purpose of the risk management
- Main objectives
- Risk management principles
- The commitment of management to risk management
- Allocated responsibilities for the process and results
- References to the methodology and process to be used
- Level of acceptable risk for the company.

The document is public and circulated to all employees. Its optimal length is 1 to 2 pages, and it should be in line with other management policies, if they exist in the company, such as Quality management policy or Information Security Management policy. The policy should be reviewed at least annually to reflect the changes in the environment of the company in which the risk are identified, assessed and managed, as well as the level of acceptable risk.

4.3. Methodology and Process

The risk management methodology includes comprehensive and implementable guidelines for conducting the risk management process. It enables the company to:

- Identify process and asset related threats and vulnerabilities
- Repeatedly conduct risk assessment with comparable/consistent results taking into account the already implemented mitigation steps
- Get a prioritized list of key risks using a common qualitative scale
- Decide on the level of acceptable risk for the company
- Identify further mitigation action necessary
- Define a realistic Risk Treatment Action Plan with necessary resources, priorities for the actions, responsible person

The methodology enables consistent implementation of the Risk management process and its activities. The Risk Management team should understand the Risk Management methodology and should be trained and competent to implement the Risk Management process.
The activities should be performing in consultative manner, using facilitated working groups or collaborative tools.
The duration of the risk assessment should be reasonably short i.e. 2-4 weeks, with annual review dynamic or in exceptional cases per major change or staring of a new project.

4.4. Tools

Risk management toolkit is a usable software tool (spreadsheet or more advanced software) for gathering, calculating and presenting risk assessment results as well as other related information. It can include:

- the process and/or asset register,
- the risk identification register,
- the risk assessment register,
- the risk treatment plan,
- the risk treatment action plan,
- the risk measurement/monitoring log.

The benefits of using a toolkit is the automation of the calculations required for the risk assessment, as well as possibility for manipulation of the risk management results for better and more understandable presentation which will allow for adequate decision making by the management.
The toolkit should allow a maximal human influence on the results, as the risks identification and their assessment cannot be automated and still provide a usable result for the IT centric micro and small enterprise.

5. Conclusions and Future Work

IT-centric micro, small and medium enterprises (MSME) have a need for holistic and comprehensive risk management that ensures informed decision making from the managers and owners. The existing risk management frameworks and methods for risk assessment are not suitable as they take too much time and effort, are based on complex models and are difficult to implement as they do not cover all the risks for the organizations. The newly developed framework with the hybrid risk assessment model meets the challenges of the MSMEs and provides a prioritized list of risks at the end of the exercise suitable for managerial decision making.

Some of the open issues that still remain include integration of risk management into the daily management of the organization, and development of easy-to-use tools what allow the flexibility and simplicity needed for MSMEs but still provide repeatable, consistent results that support decision making. Future work should as well take into account the changing environment of MSMEs specifically integration of social media into the business models and exposure to cyber threats due to the interconnectivity of the operations.

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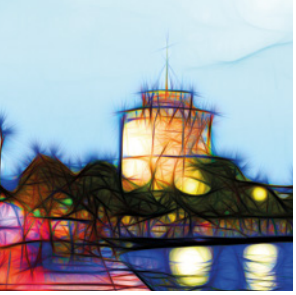

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EFFECTS OF PERSONAL NETWORKS ON THE EVALUATION STAGE OF NEW VENTURE IDEAS: THE MEDIATION ROLE OF STRATEGIC RESOURCES

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The purpose of this paper is to explain how nascent entrepreneurs evaluate new venture ideas under the indirect effect of various features of their personal network. Based on the literature, a conceptual model was developed to include four strategic resources through which the entrepreneurs' personal network influences the evaluation stage of the new venture ideas. To test the developed model, a quantitative study was conducted. We used a survey to collect data among 130 nascent entrepreneurs in Tunisia. Data were analyzed using Partial Least Squares Structural Equation Modelling [PLS-SEM]. Our results show that network size, strength of ties and socio-economic status of alter enable the exchange of some strategic resources (moral support and instrumental support) between the nascent entrepreneurs and the members of their networks. Our results also attest that moral support is the only strategic resource through which the entrepreneurs' personal networks influence the evaluation stage of the new venture ideas.

Keywords
Evaluation New Venture Ideas, Nascent Entrepreneurs, Personal Networks, PLS-SEM, Strategic Resources

1. Introduction

Entrepreneurship literature reveals that entrepreneurs' interpersonal relationships are of great importance in the process of entrepreneurial opportunities recognition [1], [2], [3], [4]. The literature review reveals that most former work did not sufficiently explore the role of entrepreneurs' personal networks in each of the perception and the evaluation stages of this new venture idea recognition process.
This work focuses on the evaluation stage of a new venture idea and attempts to bridge existing theoretical gaps. Its aim is to explain how nascent entrepreneurs assess new venture ideas based on the various features of their personal networks. In other words, this work seeks to explain how entrepreneurs' personal networks constitute a source of strategic resources that could facilitate their assessment of the new venture ideas. Therefore, we seek to answer the following question: *what are the strategic resources that nascent entrepreneurs access through their personal networks and that could affect the evaluation stage of the new business ideas?*

2. The strategic resources required by nascent entrepreneurs in the evaluation stage of the new venture ideas

In recent years, the evaluation of new venture ideas has emerged as a major theme of entrepreneurial research [5]. Researches find that the evaluation of business opportunities is a crucial step in the entrepreneurial process because it is an irreversible stage between the opportunity identification and that of its exploitation [6]. The entrepreneur requires to follow a rigorous approach to assess the feasibility [7], profitability [8], viability [9] and novelty [10] of the new business ideas. Entrepreneurs need a variety of strategic resources in the entrepreneurial activity [2]. In this study, we are interested in the strategic resources that entrepreneurs require in the evaluation stage of new business ideas. According to Turki and Mezghani [11], entrepreneurs require a set of strategic resources to evaluate new venture ideas, which are *strategic information, advice, moral support and instrumental support.* There is growing evidence that these four strategic resources come from social interactions of entrepreneurs. On the ensuing title, we define entrepreneurs' personal networks. Then we represent its features and we develop the research hypotheses.

3. Entrepreneurs' personal networks and the evaluation of the new venture ideas

Personal networks consist of the set of persons (alter) with whom a focal individual (ego) maintains social relationships [12]. Through the social relationships embedded in their personal networks, nascent entrepreneurs can gain access to strategic resources to evaluate new venture ideas. The likelihood of the exchange of those resources depend on the quality of four relevant aspects of personal networks, which are the network size [13], the strength of ties [14], the socio-economic status of alter [15] and the network range [16].

3.1 The indirect effect of the network size

Network size refers to the number of persons with whom entrepreneurs maintain direct relationships [13]. Borgatti et al. [17] support the importance of building broad personal networks. The authors assert that: "The more people you have relationships with, the greater the chance that one of them has the resources you need ". In the same vein, Rejeb et al. [18] demonstrate in their research that: "the larger the size of the network, the more potential resources are stored and are available within the network".
Entrepreneurs need to strategic information to identify new opportunities, achieve their goals and eventually escape threats [11]. To be strategic, information must be valuable, rare, difficult to access and non-substitutable [19].
A study conducted by Ozgen and Baron [3] on a group of aspiring entrepreneurs, shows that strategic information is a crucial resource that allows entrepreneurs verifying the feasibility of entrepreneurial opportunities. Thus, we predict that broad personal networks provide a more important access to strategic information, which allows evaluation of the feasibility of the new business ideas. Similarly, other studies have reported evidence indicating that strategic information plays a role both in identification of business idea and in checks of its feasibility

before that the entrepreneurs concluding that they have recognized bona fide business idea to create a viable new venture [7], [3].
Some studies in the field of entrepreneurship highlight also the importance of the instrumental support in the evaluation stage of new venture ideas. Instrumental support involves tangible assistance aimed at solving a problem, obtaining a financial or material aids [4].
For example, the qualitative study conducted by Turki and Mezghani [11] among six nascent entrepreneurs shows that instrumental support is a crucial resource that allows entrepreneurs to assess the feasibility of new venture ideas. Thus, we predict that broad personal networks provide the entrepreneur with strategic information and instrumental support, which allows him/her to evaluate the feasibility of the new venture ideas. The above discussions lead to the following two hypotheses:
Hypothesis 1: The effects of entrepreneur's personal network size on the evaluation stage of the new venture ideas are mediated by the access of the entrepreneur to strategic information.
Hypothesis 2: The effects of entrepreneur's personal network size on the evaluation stage of the new venture ideas are mediated by the access of the entrepreneur to instrumental support.

3.2 The indirect effect of the strength of ties

The strength of ties refers to the nature of relationships between the entrepreneur and alter in his/her network, which are either strong ties or weak ties [14]. Weak ties represent an important source of non-redundant information, whereas, strong ties reflect relations that are rich in emotion which give entrepreneur moral support. Previous studies in entrepreneurship field show the importance of moral support for entrepreneurs, especially, for those who are in the start-up stage [20]. During this critical stage, moral support is a decisive resource for the entrepreneur, which allows him/her to overcome difficulties. Hence, we suggest the following hypothesis:
Hypothesis 3: The effects of the strength of ties on the evaluation stage of the new venture ideas are mediated by the access of entrepreneur to moral support.

3.3 The indirect effect of socio-economic status of alter

The socio-economic status of a person refers to the level of education, the level of income and the professional category of the later [21].
Lin [15] highlights that it is in the interest of every individual to establish relations with persons with a high social status in order to achieve their objective. Harris [22] supports this idea and he noted that: "reaching network contacts is important to the extent that those contacts are highly situated in the status hierarchy to be instrumentally effective".
Working with persons that occupy a prestigious socioeconomic status allows the entrepreneurs, on the one hand, to check whether the domain of activity, in which they are going to start, is increasing or declining, and on the other hand, to ensure that customers are accessible and that the return on investment of the future project are interesting. Thus, we can predict that:
Hypothesis 4: The effects of the alter's socio-economic status on the evaluation stage of the new venture ideas are mediated by the access of the entrepreneur to instrumental support.

3.4 The indirect effect of the network range

Network range represents the extent to which entrepreneur's relationships are with persons belonging to different fields of knowledge [22]. In this case, the network is considered heterogeneous. Rodan and Galunic [16] show that network range (heterogeneity) facilitates access to a broad set of knowledge and resources. Therefore, entrepreneurs who are related to other persons with different background are more likely to access some advice (commercial advice, technical advice, financial advice and so on). Those pieces of advice allow nascent entrepreneurs to adequately evaluate their new venture ideas. Therefore, it seems reasonable to predict that:
Hypothesis 5: The effects of the network range on the evaluation stage of the new venture ideas are mediated by the access of the entrepreneur to advice.

4. Methods

To test our model, we adopted a quantitative study based on a survey conducted among a sample of 130 Tunisian entrepreneurs who have recently set up their ventures.
In this work, we rely on former work to operationalize our variables. Moreover, we construct measurement scales for three other variables which are "advice", "the instrumental support" and "the moral support" using Churchill's paradigm.
To test our hypotheses, we used the structural equations approach based on the Partial Least Squares technique available in SmartPLS software [23], [24]. We used the approach of Baron and Kenny [25] to check the mediating effects of strategic resources. Analysis' results include both the study of the inner and outer models. The goal of the next section is to analyze our results.

5. Results

5.1 The assessment of the validity and reliability of latent constructs

We noted that all the constructs in our model are reliable because the value of their Composite Reliability [CR] is greater than 0.8. The construct validity is examined by studying both the construct's convergent validity and the construct's discriminant validity [23]. The Fornell-Larcker criterion, the cross-loadings values and the heterotrait-monotrait [HTMT] ratio, were used for assessing the discriminant validity of latent constructs [24]. The method of Fornell and Larcker [26] states that each construct in the outer model has to share more variance with its items than with any other construct. This requirement is insured for all the constructs of research. In our study, we found also that the loadings of each item on its construct are higher than the cross loadings on other constructs. HTMT ratio is the third option for checking discriminant validity. Results show that HTMT value is below 0.90. Thus, discriminant validity is confirmed [2]. A support is provided for convergent validity because we found that all the values of Average Variance Extracted [AVE] is above 0.50 and most items have outer loadings above 0.70.

5.2 The assessment of the model fit

The assessment of the model's quality is based on a set of criteria, which are Standardized Root Mean Square Residual [SRMR], coefficient of determination (R^2) and cross-validated redundancy (Q^2). In table 1, we notice that the values of Q^2 for the majority of endogenous variables constructs are satisfactory expect for the Q^2 value of the "advice", which is below zero. This result is not surprising since we have found that the R^2 corresponding to this variable is not significant. This does not mean that the model is of poor quality. Indeed, Nitzlp [27] noted that, "A Structural Equation Model can yield a very good global-fit-index, but at the same time, the coefficient of determination can be extremely low".

Table 1 The assessment of the model's quality

Constructs	SRMR	R^2	P values	Q^2
Strategic information		0.028	0,627	0.003
Instrumental support		0,109	0.049	0,048
Moral support	0,057	0,097	0,233	0,032
Advice		0,025	0,581	-0,010
Evaluation of the new venture ideas		0,192	0,045	0,057

5.3 The test of research hypotheses

According to the figure 1, only the hypothesis 2 is accepted in our study. Indeed, the effect of strength of ties on moral support is significant (β= 0,260; p=0,022). In addition, the effect of the moral support on the evaluation of the new venture ideas is significant (β= 0,371; p=0,006). Moreover, Bootstrap results show that the indirect link between "the strength of ties" and the "evaluation of the new venture ideas" is significant (p = 0.025) and positive. The weight of this link is equal to (0,105). Although, the path coefficients for "network size" and "socio-economic status of alter" are respectively significant (β= 0,216; p=0,005 and β= 0,168; p=0,06), the hypotheses 1 and 2 are not supported because the path coefficients for instrumental support is not significant (β= -0,164; p=0,131). The path coefficients for "network range" and "advice" are respectively not significant (β= -0,168; p=0,109 and β= 0,039; p=0,736), therefore the hypothesis 4 is not supported.

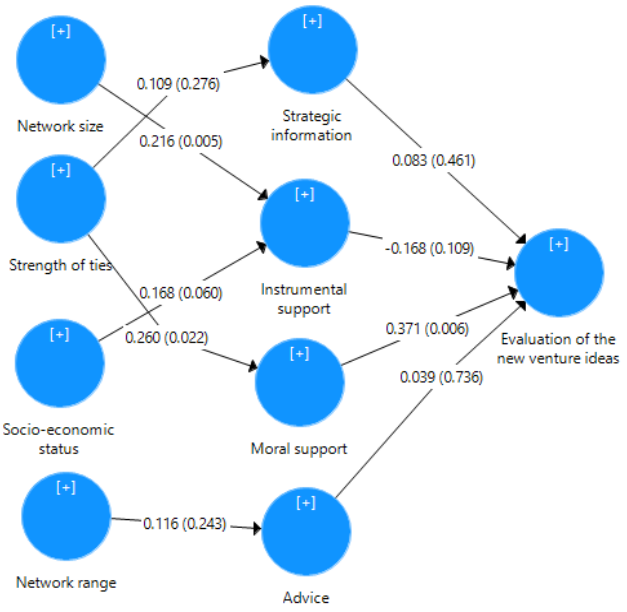

Figure 1 The significance of structural equations in the research model

6. Discussion

Unlike some previous studies, our results did not support the importance of a large personal network to access to strategic information that entrepreneurs require to evaluate new business ideas. This leads us to believe that entrepreneurs, in our context, limit the number of people with whom they discuss their project ideas to avoid leakage of information about their projects. This result corroborates what was found by [1].

The results also underline the fact that entrepreneurs, who are embedded in broad personal networks, which are composed of alter with a high socioeconomic status, are more likely to reach instrumental support. These are consistent with the findings of previous research [15], [13], [18], which state that network features such as “network size” and “socio-economic status of alter” were found to promote the entrepreneur's access to instrumental support. However, as demonstrated above, instrumental support is a strategic resource that does not support the evaluation of the new venture ideas. This is a counter-intuitive result because there are growing evidences that maintaining interpersonal relationships with actors who have a high socioeconomic status ensure some powerful instrumental support (eg., recommendation, favoritism, legitimation, solving problems, financial help and so on).

Although, previous studies in entrepreneurship research made little attention to moral support as a strategic resource through which personal network influence the evaluation stage of the new venture ideas, our study demonstrates that moral support is a relevant strategic resource in this stage. The results shown in figure 1 indicate that nascent entrepreneurs receive moral support from strong ties. Based on reciprocity and trust [14], this kind of relationships help nascent entrepreneurs to assess their business ideas [4].

Entrepreneurs who maintain bonding relationships with different individuals (family members, friends, mentors, customers, suppliers, investors and so on) advance more rapidly in their start-up business activities, receive more information about business opportunities and have greater

access to moral support than those who lack strong ties in their personal network. This can be explained by the fact that in this kind of relationships, members of entrepreneurs' personal networks are more likely to assist and support each other. Indeed, a network with a high number of strong ties has a closed structure that facilitates social control, strengthens cooperation, builds trust among members and prevents opportunistic behaviour.
Surprisingly, it is found that "advice" is not a strategic resource trough which the personal networks (network range) facilitate for the entrepreneurs the evaluation of the new venture ideas. This result did not corroborate those found in the literature. We think this is due to the following two reasons: The first reason is the composition of the sample. Indeed, 78.5% of the sample is made up of men and 21.5% by women. According to Robinson and Stubberud [28], male entrepreneurs have less reliance on the advice from their networks than female entrepreneurs do. The second reason refers to the high percentage of entrepreneurs, who have professional experience before building their enterprise. Indeed, in our sample, 83.1% of entrepreneurs have previous professional experience. According to Ucbasaran et al. [29] and Westhead et al. [30], habitual entrepreneurs are more able to assess the desirability and feasibility of their venture ideas than novice counterparts.

7. Conclusion

The present study suggests methodological contributions to existing entrepreneurship literature. Firstly, we used PLS-SEM method which has only been partially utilized in entrepreneurship field. Secondly, we suggest valid and reliable measurement scales for three constructs, which are "advice", "moral support" and "instrumental support".
In addition, our research presents some practical implications for nascent entrepreneurs. It draws their attention about the types of strategic resources they require to assess new venture ideas. The main limitation raised in this research is the retrospective nature of the collected data. Thus, a more complete understanding of how new venture ideas are evaluated requires a real-time data collection approach by asking future entrepreneurs to describe this stage as it unfolds rather than as they recall it later.

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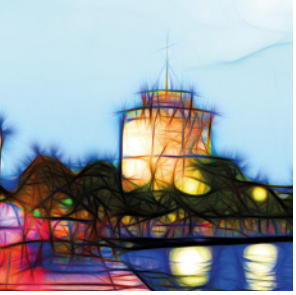

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INESS: THE INTELLIGENT ENTREPRENEURIAL ASSISTANT SIMULATION. SIMULATING THE DECISION-MAKING PROCESS

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Entrepreneurship is considered an important factor in developing a stable socio-economic environment. During the past decades, the research about entrepreneurship has experienced significant renovation in exploring entrepreneurial personality and the way that an entrepreneur acts. In addition to the personal characteristics and their interaction with the business environment, the researchers focused on how the entrepreneur makes decisions on the establishment, operation and development of the business. In recent years, significant efforts have been developed to support entrepreneurs in the decision-making process. However, up to now, the existing software solutions did not yield the desired results and the simulation of entrepreneurial process remains a challenge. The proposed software agent with the name Intelligent Entrepreneurial Assistant Simulation (INESS) will be an intelligent personal assistant (IPA) providing the entrepreneur and the startups the required information from the idea formation to the business development, based on user input, location awareness, and information derived from a variety of online sources and from the entrepreneur's personality.

Keywords
Entrepreneurship, Data mining, Decision making process, Intelligent Personal Assistant, Virtual Agent

1. Introduction

Living in the digital era, one of the most valuable sources for any business is the data and the knowledge that can be drawn from them. Today, organizations and businesses collect large amounts of data from different sources on a daily basis. Within this scope several questions can be posed such as, how is a system supplied with the appropriate information to assure a smooth and successful future for the business? How the vast amounts of data existing in the business world are collected, recovered and converted into useful information that can make a company competitive? How can the entrepreneur get benefit from all this information, since the size of this data is overwhelming?

The answer to these questions is coming from the scientific field of Data Mining and Artificial Intelligence through their very powerful tools and methods.

2. Background

Several theories and approaches were supported for the explanation of the entrepreneurial phenomenon. These theories and approaches are related to environmental and economic factors, the degree that a society promotes the entrepreneurial cultivation, intentions and attitudes, personal characteristics and the personal cognitive state during the decision-making procedure.

Moreover, during the previous decades, entrepreneurship sector has experienced significant growth in exploring entrepreneurial personality and the way that an entrepreneur behaves. Besides his personality traits and their interaction in the entrepreneurial environment, researchers focused on the decision-making process and the factors that influence the entrepreneur's decision on the establishment, operation and development of a company.

Several business applications have been developed for the companies in the support of the decision making of the entrepreneur. However, the conversion of large amounts of data into knowledge and the possibility of exploiting the data to gain a better perspective of the situation remains a challenge for most organizations and businesses.

So far, a system that can simulate the mechanism of business decisions and propose solutions / recommendations to the entrepreneur based on his personality, but also based on the best objective proposal / solution has not been developed in a wide extent.

3. Purpose

Nowadays, it is extremely difficult for any business to adapt its activities taking into account all the necessary informative data as organizations and businesses collect large amounts of data from different sources on a daily basis. Until today there are several software solutions for assisting an entrepreneur to the decision-making process (e.g. Advanced Decision Environment for Process Tasks – ADEPT). [1]

Nevertheless, a deeper look may show that none of them has the ability to take into account a number of parameters and variables associated with the entrepreneurial personality and the business environment.

Therefore, the necessity to develop a smart entrepreneurship support agent and in particular for the solo entrepreneur or micro enterprises is obvious. Such an agent will definitely contribute to the strengthening of small businesses development through supporting the crucial decisions based on a large number of variables and can be used in parallel as a high end learning system.

Eventually, the use of such a cutting-edge software will give a significant competitive advantage for any business.

4. Decision Making Process

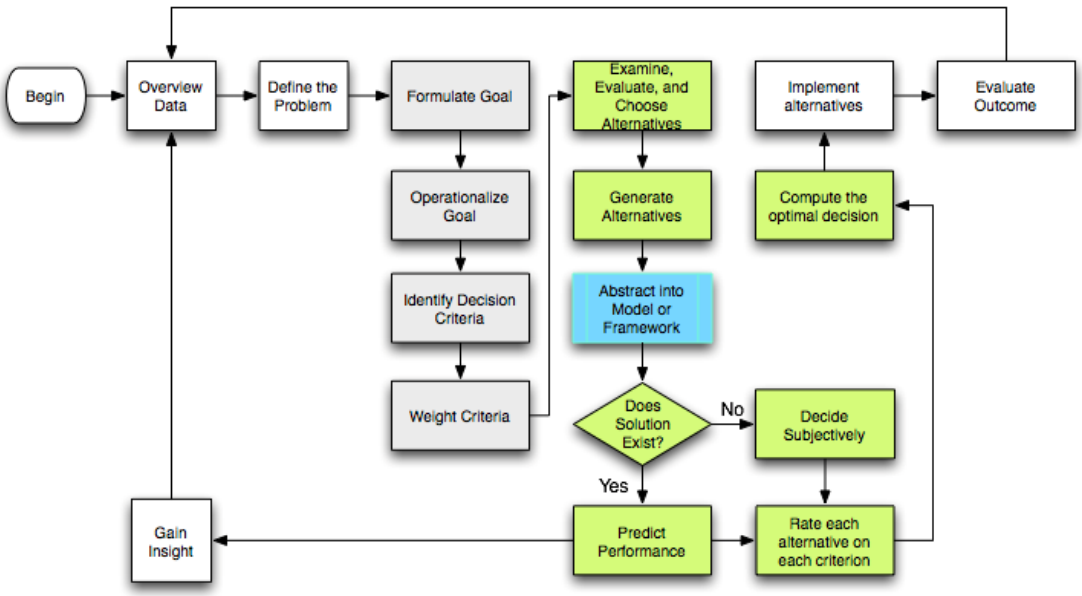
Entrepreneurs need to take important decisions in different fields and under different conditions. These decisions cover a number of areas relating to the establishment, development and operation of the company and can be indicatively apply to the following areas as recorded by Kuziot & Vasileiadis (2012): [2]

Table 1 Business Decisions.

Main business function	Operation
Opportunity recognition and evaluation	1. Identify entrepreneurial opportunities
Management	1. Leadership and Human Resources management 2. Time management 3. Business development and success 4. Risk Management 5. Quality management
Marketing and sales	1. Communication 2. Market analysis and research 3. Pricing 4. Advertising 5. Marketing
Financial management – Issues related to law and taxes	1. Monitoring financial flows 2. Financial analysis

For several of the above operations an entrepreneur may use a Decision Model which is a computer based system that predicts the outcomes of decisions (Figure 1).

The relationships between elements of the decision and the forecasted results are mapped in order to understand or control problems. The decision model may also predict what will happen if a certain action is taken.



Source: http://www.businessdictionary.com/definition/decision-model.html

Figure 1 Decision Model

Despite the purpose of this paper is not the research of the decision-making process, it is important to highlight the factors that influence decision making process in order to understand the way that an entrepreneur thinks and acts. The most important one can include past experiences, a variety of cognitive biases, an escalation of commitment and sunk outcomes, socioeconomic factors (age, gender, status etc), and a belief in personal relevance. These factors may impact the decision-making process and the decisions made by an entrepreneur Dietrich, C. (2010). [3]

Indicatively, some of these factors are summarized to these categories:

- Entrepreneurial Personality (Risk taking, Intentions, Skills, etc.)
- Environment (Political, Economic, Social, Sector, etc.)
- Competition (Intense, Geographical distribution, etc.)
- Company financial data (Startup capital, Cash flow, Break even, loans, funding, Sales, etc.)
- Relationships (Relationships with others, etc.)

5. INESS

5.1 INESS Agent

Artificial Intelligent Systems like the proposed agent INESS can provide new potentials, facilities, services and contribute in multiple ways to any field of human activity applied. FIPA (Foundation for Intelligent Physical Agents), defines an intelligent agent as the fundamental unit of activity (actor) in a region. It combines one or more services capabilities in an integrated and unified execution model, which may include access to external software users (people) and communication mechanisms.

A more detailed definition for intelligent agents was given by Wooldridge & Jennings (1995), referring to the properties that such a system must have:

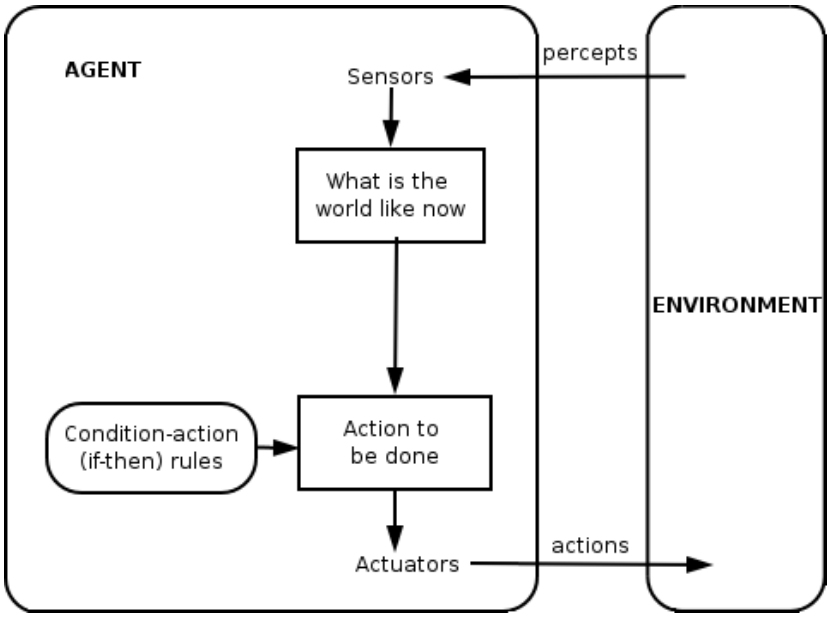
- Autonomous: must solve their own problem without the intervention of humans or other agents, and to control their own actions and internal stage.
- Able to act social: agents must interact with other agents to complete their problem solving and to help others with their activities.
- Proactive: the agent should take the initiatives
- Responsive: the agent should perceive the environment and respond in a timely fashion to changes in it. [4]

Such systems could act as personal assistants to be adapted to the needs and particularities of each user and learn the habits, observing his actions. The initial idea for the development of INESS Agent is based on the need for better decision making by the entrepreneur based on specific variables that affect the business process, without the user requesting it through an artificial intelligent system.

INESS, like most software agents, will be supported by an intelligent user interface wherein the user interacts with the artificial assistant at a higher and more natural level. The user can select his/her preferences and the business stage that he/she is in and INESS can provide solutions to the everyday problems that the entrepreneur has to cope with. The agent will receive through its sensors the questions, instructions, commands or user requests, which can be set in a variety of formats.

The software proposals will be based on: a) The user business stage and sector b) The user preferences c) Data from other external databases d) The recognition of the repeated actions that a user performs on a device (common locations, repeated calendar appointments, search queries, etc.) e) Other users' preferences matching to the users' profile f) Answers to questionnaires etc. INESS intelligent core will use several data mining and statistical techniques to identify the most important factors in decision-making process and to anticipate the success/failure.

After the core system processes end, the information instantly will be provided in a precise, intuitive manner. (Figure 2)



Source: https://en.wikipedia.org/wiki/Intelligent_agent

Figure 2 Software Agent Architecture

5.2 Data Mining

The matrix of INESS agent will be based on the techniques of data mining science. Data mining helps modern companies to focus on the most important elements of their data warehouses. By using this powerful tool, it is possible to predict future behaviours and successful business decisions.

A definition close to this purpose was given by Ellen Monk and Bret Wagner (2006) "Data mining: the statistical and logical analysis of large sets of transaction data, looking for patterns that can aid decision making." [5]

Data Mining is an iterative process consisting of a series of steps which lead to the collection of data on the discovery and extraction of useful information from them:

- Data Cleaning: In this step, are removed from the database those producing noise, i.e., all those elements which may affect or distort the result.
- Data Integration: In this step, the inhomogeneous data that was collected from multiple sources are integrated into one database.
- Data Selection (Data selection): Of all the available data, carefully selected those that are relevant and useful for the analysis to follow.
- Data Transformation: The selected data are modified so that their form is suitable for the extraction process.
- Data Mining: Is the most important steps of the process and that's why at this stage, a variety of sophisticated techniques (*decision trees, neural networks, genetic algorithms, rule induction, etc.*) are used to extract potentially useful standards.

- Pattern evaluation: This step recognized useful patterns representing knowledge, specific evaluation measures (evaluation measures).
- Knowledge Representation: In this final step, the knowledge that has been discovered is presented to the user, thus helping to understand and interpret the results of data mining.

At this point it should be mentioned that the user, has the ability to modify the assessment measures to perfect the extraction process to select new data to further amend existing or incorporate based news from new sources, with the ultimate aim of drawing different and more relevant results.

6. Conclusions

The aim of the present paper is to propose the development of a virtual agent for entrepreneurs by simulating the entrepreneurial activity and personality. This ambitious agent will take advantage of the vast amounts of information existing inside the business environment, but also the big data that are flooding the network. The agent will be able to suggest the optimum decision to the entrepreneur based on a holistic evaluation of variables and factors. The development of this powerful tool can strengthen individual entrepreneurship as far the entrepreneur usually has no access to big-scale data and it is not possible to assess all available information.

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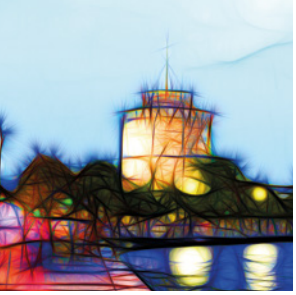

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FROM INNOVATIVE IDEAS TO SUSTAINABLE START-UPS (THE CASE OF 16 START-UPS FROM INNOVATION HUB TIRANA)

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Supporting start-up initiatives appears to be a goal for many organizations around the world. The way how these organizations support startups is mostly financial support and less nonfinancial support. The main objective of this paper is to analyze the role of financial and nonfinancial supportive instruments used by different institutions and organizations toward the success and sustainability of startups. The research question of this paper is: What kind of support do startup initiatives need in order to be successful and sustainable? The hypothesis is: Startup initiatives need nonfinancial support in order to be successful and sustainable in the long term. To test this hypothesis, a qualitative analyse has been done, based on in-depth interviews with 16 startups supported by Innovation Hub Tirana.

Keywords
Entrepreneurship, Entrepreneurial Ecosystems, Financial and Nonfinancial Support, Role Models, Start-Ups

1. Introduction

In 2016, I read a book by Ivo Spigel, "The European Start-up revolution", which presents a very interesting analysis of start-ups based on personal interviews of the author with representatives (entrepreneurs) of a number of start-ups in Europe [1]. I was quite sure that I "got" the main answer to the question: "Which is the magic rule to build a start-up?" But the answer was "It doesn't exist"! There is no specific and standard way to create a start-up. Each start-up has its own way of creation and implementation. The three common characteristics of all start-ups are: start-ups are younger than 10 years, start-ups feature innovative technologies and/or business models, and start-ups have (strive for) significant employee and/or sales growth. Lifecycle theory and complexity/chaos theory are two main theories that try to explain the success/failure of a start-up.

2 Literature Review on Entrepreneurship and Start-ups

Organizational lifecycle theory (a consistent and predictable process) is usually used to explain growth and development of start-ups [2]. However, this theory seems to be superficial, and does not explain many details about start-ups needs, especially about start-ups in developing countries. In countries where the mechanisms for start-ups growth are poor or do not exist, start-ups need more than 3 stages in their lifecycle. The three-stage theory (opportunity stage, technology setup and organization stage, exchange stage) [3] does not explain in detail what happens in the lifecycle of a start-up. The four-stage theory (conception and development, commercialization, growth, stability) [4] and the five-stage theory (prototype, model shop, start-up, natural growth, strategic manoeuvring) [5] are also insufficient to make a realistic explanation of start-up lifecycle. The ten-stage theory [6] seems to be closer to the idea of start-up lifecycle explanation in the Albanian context. Based on this theory, start-ups grow through 10 different stages: development of concept/ completion of product testing, completion of product prototype, initial financing, completion of initial plant testing, market testing, first batch production, early sales, first competitive activities, first redesign or adjustment of direction, first major adjustment of prices.

On the other hand, Complexity Theory [7] assumes that the lifecycle theory is not relevant to innovation and start-ups, or even to organizations themselves, because of the nature of each organizational structure. Referring to Complexity Theory, start-ups are dynamic, nonlinear, and unpredictable. Nevertheless, start-ups try to create their own order for their daily work by choosing continuous change.

Table 1 Comparison of Two Views of Start-up Development [8]

Theoretical Perspective	**Lifecycle theory**	**Complexity theory**
Basic assumptions	1. Holistic viewpoint. 2. Organizations are stable systems. 3. The environment is predictable and change is an exception.	1. Individual viewpoint. 2. Organizations are dissipative structures. 3. The environment is unpredictable and change is the rule.
Main arguments concerning the development of start-ups	1. The development of a start-up is a progressive and predictable process. 2. This process is constructed from different stages. An organization should possess different management skills, make different decisions, and assume a different form during different stages. 3. Start-ups will encounter a crisis during each stage. Whether a start-up can survive and continue to grow hinges upon whether it can manage these crises. 4. Entrepreneurs can predict what problems the organization will encounter in the future and map out response	1. The development of a start-up is a chaotic process. 2. This process consists of a series of new emergent orders, and an organization therefore exhibits discontinuous growth. 3. Start-ups may encounter "thresholds" or "transitions"; a start-up can exhibit a new order only after it surmounts such a threshold. 4. It is difficult for entrepreneurs to make advance plans because they cannot predict what new order emerge. Entrepreneurs can rely on their vision, however, to guide the actions of other members of the organization

	strategies and plans ahead of time, which will eliminate all uncertainty and change.	and maintain flexibility with regard to future development.

3 Methodology

To test the hypothesis of this paper, a qualitative analysis has been used, based on in-depth interviews with 16 startup-s supported by Innovation Hub Tirana. The results have been collected in 5 groups, based on the characteristics of each startup. The interpretation of the results has mainly focused on the experience that these startups have at Innovation Hub Tirana and factors that positively/negatively influenced their daily work.

3.1 Data collection

In this research has been used a semi-structured interview with 9 closed questions and 9 open questions. Both parts of the interview aim to understand the experience of these start-ups at Innovation Hub Tirana, their target groups, founding, challenges and lessons learned.

4 Entrepreneurship and Innovation in Albania

A country cannot successfully face global competition if its economy does not guarantee funding sources for growth, in order to be able to penetrate the international market. In the context of depletion of funding sources for economic growth (such as remittances), innovation (technological and non-technological) is regarded as one of the new long-term generators financing growth for at least ten years ahead. Innovation ranks as one of the four basic sub-indices of the Global Competitiveness Index, and one of the twelve pillars of the index. Albania is currently in the second stage, an economy led by economic efficiency.
Albania persists to have poor performance in most indicators of global competitiveness. The most problematic factors for doing business in Albania are corruption, excessive government bureaucracy, tax schemes, crime rates, inflation, political instability, infrastructure, lack of innovative capacity, etc. On the other hand, the Report on the Global Innovation Index (GII)[1] is calculated taking into consideration two main sub-indices, the sub-index of inputs that includes institutions, human capital and research, infrastructure, market and business sophistication, as well as the sub-index of outputs, which includes knowledge & technology outputs and creative outputs. Each of these elements is specified in some other even more detailed sub-elements. If we compare the performance of the progress made in terms of this index during the period 2010-2016, the results are disappointing. In 2010, Albania was ranked in the place 81/142, while in 2016 it was ranked in the place 92/128, i.e. 11 positions lower than 6 years ago.

[1] Annual Report on innovation level for different countries, written by Johnson Cornell University, INSEAD (The business school for the World) & WIPO (Intellectual Property organization)

4.1 Startup Ecosystem in Albania

According to the European Startup Monitor (ESM, 2016), which analyzed 2515 start-ups in Europe, the average age of start-ups is 2.4 years old, 77.7% of them are planning internationalization, the percentage of female start-up founders is only 14.8%, and the average of employees is 12. More than 90% of the start-ups described their business situation as good or satisfying. The biggest challenges that these startups are facing include sales and/or customer acquisition, product development and growth. ESM mentioned 7 main European Startups Ecosystems: Cyprus, Hungary, Ireland, Poland, Portugal, Slovenia and Switzerland. The common characteristics of these ecosystems related to: liberal economy, National Policy Statement for Entrepreneurship and competitive startups, low income tax rate, high percentage of foreigners and multi-lingual, entrepreneurial spirit, digital skills, culture of innovation, shared resources etc. [9]
The start-up ecosystem in Albania is new and not experienced enough in the domestic and international market. However this ecosystem is developing rapidly. Young entrepreneurs, business partners and the government seem to have a clear idea about the role that this ecosystem plays in society. Main actors of Albanian Ecosystem of Start-ups include: Garazh, Incubator.al, Oficina, Protik, Startup Grind, Startup Live, Talent Garden, Softmogul, Dentem, Manderina, KreatX, Yunus Social Busines Balkans etc. The main problem of this ecosystem in general is the fact that most of the actors work individually and do not actively participate or initiate real partnerships based on open innovation strategies and sharing ideas. Innovation Hub Tirana seems to be the first governmental initiative that aims to fill this gap in the ecosystem, by creating an open and free space, not only for new start-ups and entrepreneurs, but also for all actors of the ecosystem in Albania and Kosovo.

4.2 The Case of Innovation Hub Tirana

The main objective of the Innovation Hub Tirana project, managed by the Albanian State Minister for Innovation and Public Administration, is to promote and support the social inclusion and sustainable employment programs for young people by enhancing their active involvement in ICT entrepreneurship, creative, innovative and competitive actions through capacity building, and partnership development and growth of entrepreneurial activity, start-ups and SMEs. Innovation Hub was a two year project founded by Italian-Albanian Debt for Development. As part of this project, Innovation Hub Tirana supported financially and non-financially 16 start-ups in Albania, with the main focus on innovation and ICT. In order to understand how the support from Innovation Hub has influenced the progress of these star-ups, we asked them to participate in an in-depth interview with semi-structured questions. As part of the results analysis, below are described five representative cases of the start-ups which participated in this interview.

4.3 Findings from start-ups at Innovation Hub Tirana

The average number of employees in these start-ups is 3. The industry or primary business activities of the start-ups are education, art, accommodation and tourism. It was quite difficult

for them to specify the target group of their start-ups, which means a very bad indicator for the long-term success of these start-ups. There were very few cases in which the target group was defined and clear enough for the main purpose of their activity. They used different resources to conduct market research for their start-up ideas such as the Internet, potential customer's needs and expert advices. Channels used to promote new ideas were mainly social media such as Facebook, Instagram and Twitter. Other forms of marketing, such as face-to-face meetings, e-mails, company website, events etc., have also been very useful for this purpose. All start-ups were asked about security measures taken to protect their business data and the answers mainly related to regular data backup, antivirus software and spam filters. Most of these start-ups have received governmental funds only. Nevertheless, the maximum amount provided by Innovation Hub for each start-up was 3500 €. Finally, at this stage, the most important things for these start-ups were: strategy/operations guidance and knowledge, funding, and staff.

4.3.1 Art Cadeau

-***The main difficulties on your daily work?*** "Generally, work is doing well, with the exception of the cases where I have to cooperate with non-cooperative people, and when I have to try harder to accomplish something. One of the difficulties at my daily work is the absence of input that Albania offers for this startup".
-If funding were not an issue, what would you do immediately to improve and expand your startup/ enterprise? "If funding was not an issue, then it would be useful for me to get better and more modern equipment than those I currently use. Technological progress is incredible. And of course I would work harder to come up with better ideas and better products in order to expand the market and sales in general".
-If you could form a partnership with any organization/company, which would it be and why? What would you hope to achieve by doing so? "If I could cooperate with a company that operates in the field of design then, both parties could profit. The main profit would be exchanging ideas and finding ways to improve the existing ones taking into consideration the experiences from both parties".
-How important was Innovation Hub Tirana for your startup idea and why? "Innovation Hub Tirana has been extremely important for my startup, by giving continuous support to this start-up. Innovation Hub Tirana has continuously supported the project, it has shown interest on its progress, and has given free working space for our activity".

4.3.2 E-book

-***The main difficulties on your daily work?*** "It is not an easy task to start something from zero. A small team needs a lot of passion and determination. Among the main difficulties is the work with the banks to create an application which will be the main online platform for paying the services for e-books. At the same time this is one of the challenges of the project. After overcoming this obstacle, two main applications will be functional: self-publishing for writers and e-book distribution, which will serve as e-commerce".

-If funding were not an issue, what would you do immediately to improve and expand your startup/ enterprise? "The project is still in the implementation process. There is a lot of work to do and to improve, such as cost reduction for book publishing and to improve the services of the digital library to attract clients willing to purchase our services and develop the marketing experience. It is essential for the start-up to take part in the market and to be able to fill a gap in that market. As a small business, first of all, we need to focus on the market and later on we will look for a chance to expand. We must focus to our target group to add value to their business and their life".
-If you could form a partnership with any organization/ company, which would it be and why? What would you hope to achieve by doing so? "To realize the project it is important to have partners from banks, publishing houses, etc. The project will try to have partnerships and collaboration with international publishing houses as well".
-How important was Innovation Hub Tirana for your startup idea and why? "The government institution and especially the Ministry of Innovation and Public Administration with its project Innovation Hub played a key role for the financial support of the start-up. Innovation Hub staff gives us advice and possibility for sharing experiences with other start-ups hosted at the same working place".

4.3.3 Spontan

-***The main difficulties on your daily work?*** "The one thing I can mention as a problem is the fact that I am not a developer. For example, if I need to add a feature or fix a bug, I need to hire and find someone to fix it".
-If funding were not an issue, what would you do immediately to improve and expand your startup/ enterprise? "I would hire a full stack developer or two developers (one for iOS/ the other one for Android). Those are the crucial flaws I'm facing right now".
-If you could form a partnership with any organization/company, which would it be and why? What would you hope to achieve by doing so? "At this moment I do not think to get one".
-How important was Innovation Hub Tirana for your startup idea and why? "They really helped me a lot with the working space. I manage to train other members of my start-up here and meet new people during the process".

4.3.4 E-school

-***The main difficulties on your daily work?*** "Finding the right people to work with, having mutual trust, good technical skills and motivation".
-If funding were not an issue, what would you do immediately to improve and expand your startup/ enterprise? "Capacity building".
-If you could form a partnership with any organization/ company, which would it be and why? What would you hope to achieve by doing so? "I will look for some experienced company that is eager to cooperate with innovators and new ideas".

-How important was Innovation Hub Tirana for your startup idea and why? "Innovation Hub boosted my idea with concrete support such as mentoring, working space, the grant and very friendly people".

4.3.5 Interactive Albania

-***The main difficulties on your daily work?*** "Since it is a YouTube-based project, the main difficulty is that YouTube does not allow us to add annotations with external links".
-If funding were not an issue, what would you do immediately to improve and expand your startup/ enterprise? "Marketing."
-If you could form a partnership with any organization/ company, which would it be and why? What would you hope to achieve by doing so? "We are looking for companies that give information about hotels, bars, restaurants and clubs around Albania. That is, nice hotspots to give a real Albanian taste to travelers."
-How important was Innovation Hub Tirana for your startup idea and why? "Innovation Hub helped me with money and inspiration for this project. I have been working on it for so long but they helped me to implement my idea."

5. Conclusions

Startups do not need just financial support, without combining it with non-financial support. Non-financial support is crucial in the early stages of a startup. Financial support is crucial during the first year of startup implementation. Financial, but especially non-financial support is crucial for the sustainability of a startup in the long term. To support startups means to make a systematic analysis of startup needs from the beginning of their innovative ideas to the moment of self-support and sustainability. Both financial and non-financial support is crucial for the success and sustainability of a startup. The case of innovation Hub Tirana gives 16 startup examples that confirm this statement. Capacity building and short-term vision seems to be the two main problems of Albanian start-ups in their daily work and their development process.

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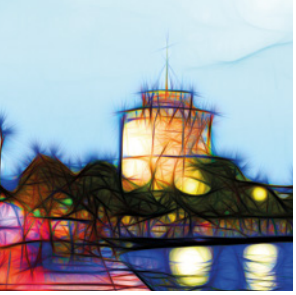

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ENTREPRENEURIAL ORIENTATION AND INNOVATION: EMPIRICAL EVIDENCE FROM TEA MANUFACTURING FIRMS IN SRI LANKA

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A firm's ability to develop and adopt innovation is important to survival in an intensely competitive market. The objectives of this paper are to examine the various types of innovations adopted by tea manufacturing firms in Sri Lanka and to ascertain the influence of the individual dimensions of entrepreneurial orientation on those types of innovation. Primary data were collected by conducting an empirical survey of 109 private-sector tea manufacturing firms in low-grown areas of Sri Lanka. The results revealed the importance of entrepreneurial orientation for the firms' innovation adoption. Specifically, innovativeness has significant influence on product innovation, process innovation, and marketing innovation. Proactive behaviour enhances process innovation and marketing innovation. Finally, risk-taking is positively related to product innovation and process innovation. Consequently, this research is vital to policy makers and managers seeking to enhance the competitiveness of tea manufacturing firms by emphasizing entrepreneurial orientation and innovation.

Keywords
Entrepreneurial orientation, Innovation adoption, Sri Lanka, Tea manufacturing firms

1. Introduction

Tea industry is considered as the foremost agribusiness sector in Sri Lankan economy more than a century. Nearly it contributes to 15% of the country's export earnings. Around 10% of the Sri Lankan population is employed directly and indirectly in the tea industry therefore it has been recognized as an important sector in Sri Lanka for reducing unemployment and poverty. At present, Sri Lanka is experiencing critical issue of maintaining its market share in the global market, compared to other leading tea exporting countries like Kenya and China. Sri Lanka becomes the high cost producer among the leading tea exporter countries and increasing labour cost mainly attributed for that. Thereby Sri Lanka is facing high competition in the global market from newly emerging low cost producer counties.

Additionally, persistent focus on orthodox and bulk tea could affect the country's competitive position. Since, global demand patters for tea is gradually switching towards the more convenient forms. More than 90% of the total consumption in developed countries is teabags and demand for retail packets is high in Middle East counties [1]. Further, [2] has shown that firms which are focused toward highly competitive markets tend to supply tea under their own brand name. Therefore innovation is essential to sustain the competitive position of Sri Lankan tea in the global market. Since, innovation is primary factor for winning the competitive market [3].

Consequently, it is vital to identify the innovations of tea manufacturing firms and influence of firm's entrepreneurial orientation (EO) on innovation. To survive in the global market, ability of developing and adopting innovation is imperative for in all industries [4] due to intense competition. Further, EO may facilitate firm's ability to combine existing assets in novel ways to extend new product, service or move in to new markets [5].

Entrepreneurship research related to Sri Lankan tea industry is rare and still in growth stage. The empirical researches related to entrepreneurship and innovations were largely centered in developed countries [5]. There are several empirical research supports the intention that the effect of EO on performance and how it fluctuates across different conditions of external environments (e.g. [6], [7]) and resources internal to the firm [8]. Past research on innovation in organizations has studied the determinants [9] and consequences [10] of innovation. According to [11], it is required perform additional work to rectify the construct of entrepreneurship and innovation. [12] Suggest it is vital to study about factors which are promoting different types of innovations (e.g. product, process). Scholars' emphasis that dimensions of EO may vary independently [13]. Therefore, further, research may benefit, to explore the multidimensional construct of EO by considering the independence of dimensions of EO [14]. Present study attempts to fill this research gap by ascertaining how dimensions of EO such as innovativeness, proactiveness and risk taking individually influence on different type of innovation.

Specifically, the objectives of this paper are;

- To examine the different types of innovations adopted by tea manufacturing firms in Sri Lanka.
- To ascertain the influence of individual dimensions of EO on different types of innovation of tea manufacturing firms.

2. Theoretical background

2.1 Innovation

This research focuses on innovation in organization. In this field, innovation is defined as development and exploit of new ideas or behaviors in the organization. It marked in terms of a new product, service or production process or a new market, organizational structure or managerial system [15]. Further, innovation can be considered as any slight improvement in product, process and organizational change [16]. Here, the key concern of innovation is whether it takes place with new elements or new combination of old elements. Therefore,

based on above arguments, operation definition of innovation of this study is developing new product, process, or market or improving existing product, process, or market.
Innovation may be generated or adopted by the organizations. Main property of all definitions of innovation is newness. Generation of innovation is a process which results in an outcome of new product, service, program or technology that is new to an organizational population or entire world. Adoption of innovation takes place when this new outcomes are acquired or imitated by other organizations [17]. Therefore, adoption of innovation results in the assimilation of a product, service, or technology which new to the adopting organization. Organizations are intended to sustain their effectiveness and competitiveness by adoption of innovations. Since, it facilitates to adapt the changing environments [15].
There are various types of innovations can be found in literature and namely they are; product, process, and marketing innovation [18]. As explain by Sundbo [18], introduction of new product to market refers as product innovation. Process innovation refers the adoption of new production process by implementing new technologies or new work routines. The utilization of new territorial markets and access of new market segments within existing markets are known as market innovation. Further market innovation indicates a firm's new market behavior such as new strategies, new markets, new alliance, etc. [18]. This study mainly focuses on three types of innovations adopted by tea manufacturing firms in Sri Lanka under the developing economic context. They are namely product, process and market innovations.

2.2 Entrepreneurial orientation and Innovation

The concept of EO is the entrepreneurship defined at firm level and it refers to firm's strategic orientation, which is relevant to firm's specific entrepreneurial characteristics of decision making approaches, methods and practices [13]. Several scholars argue that EO is a combination of three dimensions as innovativeness, proactiveness and risk taking. Innovativeness refers firm's propensity to employ and support new ideas, novelty, experimentation, technological leadership, and so forth, in both products and processes. Proactiveness relates to forward-looking, seeking first mover advantage to form the environment by introducing new product or process in advance of competitors [13]. Risk taking consists of actions such as readiness to commit more resources to project with uncertain outcomes and borrowing heavily [19]. It implies EO stands for response of firms to future or probable market needs.
According to the entrepreneurial view, innovation is the essence of independent firms that act as major agents of change in the industry [20]. EO emphasizes the strength of creating new business and rejuvenating inert firms by introduction of breakthrough innovations [13]. Innovation is an intrinsic state in the sphere of entrepreneurship, a firm's ability to introduce new product, process or markets, which are successful, should be considered in parallel [21].

2.3 Research hypotheses

The following research model (Figure 1) is proposed by considering the objectives and theoretical background of this study. The aim of this research is to examine the effect of EO on innovation adoption of tea manufacturing firms. Thus, following hypothesis is proposed.

H1 Dimensions of EO namely; innovativeness, proactiveness, and risk taking are positively related to innovation of tea manufacturing firms in Sri Lanka.

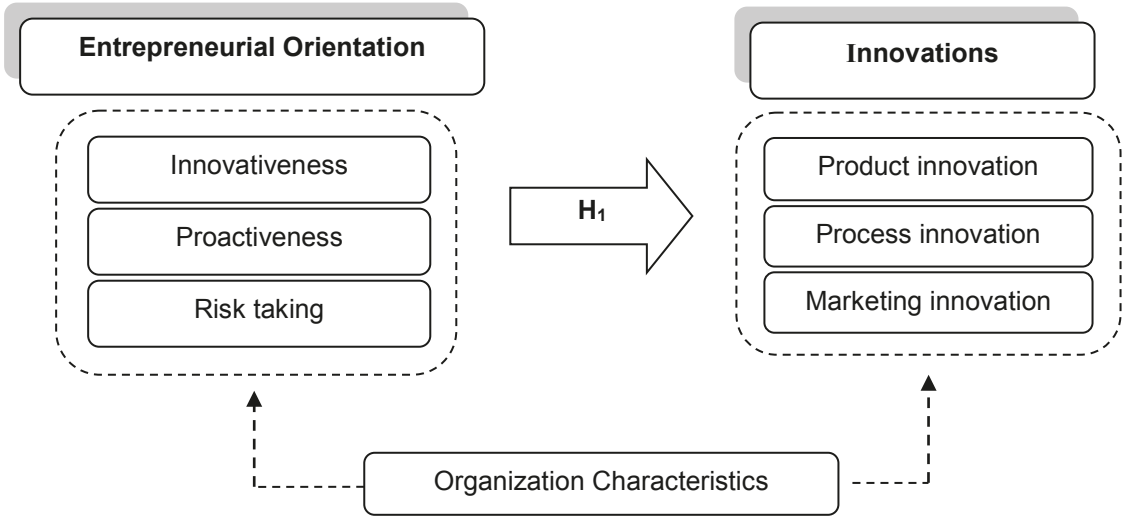

Figure1 Model of association between EO and Innovation

3. Research Methodology

3.1 Sample and Data collection

This study focuses on the four main districts that contribute most to low-grown tea production in Sri Lanka; they are Rathnapura, Galle, Matara, and Kalutara. Random sampling technique was used to select the sample and a chosen firm must have been established for more than five years to ensure sufficient data for analyzing the proposed relationships. The respondents involved in this study consist of 109 owners and managers of private sector tea anufacturing firms. Self-reported perceptions of business owners and managers are frequently used in entrepreneurship research, because those individuals are usually knowledgeable about the company's past and present plans and business situation.

3.2 Instrument of measurement and Data analysis

Primary data were collected using a pre-tested, self-administered, structured questionnaire. A subjective measurement method (five-point Likert scale ranging from 1 to 5) was used to obtain the owner's or manager's perceptions of organizational variables such as the level of entrepreneurial orientation and the level of innovation.
This study adopted the three dimensions as innovativeness, proactiveness and risk taking to measure the EO that several studies documented as high level of reliability and validity (e.g. [22], [23]). Nine items scale developed by [6] was used to measure the EO. The concept of innovation employed in this study is quite wide. It consist of both small enhancement of product, processing methods, and marketing strategy and major alterations such as the introduction of new product process and marketing strategies. Innovation was measured by adapting the three types of innovation defined by [18] that is product innovation, process innovation and marketing innovation.
Regression analysis was used to test the hypothesized relationships in the research model. Cronbach's alpha value was used to assess the reliability of scale items used to measure the different constructs (see Table 1). Firms' size and availability of green leaf (raw materials availability) were used as the control variables in this study.

4. Results and Discussion

4.1 Characteristics of tea manufacturing firms

In studied sample, 62% of tea manufacturing firms that engaged only in manufacturing bought green leaf, whereas the others use both own and bought green leaf. These manufacturing firms are principally produce orthodox type tea and only 10% of firms also produce CTC (cut, tear and curl) tea. Among them, 43% of tea manufacturing firms have achieved some type of quality standard and 15% of firms are in process of acquiring quality standards. Moreover, 19% of firms have HACCP (Hazard Analysis and Critical Control Point) and 17% have ISO 22000 food safety certification. In terms of firm size, majority (57%) of tea manufacturing firms produce 25,001 to 75,000 kg made tea per month and only 12% of them produce less than or equal 25,000 kg per month, while others (31%) produce more than 75,000 kg per month.

4.2 Innovations adopted by tea manufacturing firms

There are several types of innovations can be identified, those are; product innovations, process innovations, marketing innovations and packaging innovations. The rationale behind innovation adoption is to generate business value since effective innovators have better chance of surviving than non-innovators in same industry.

As product innovation adoptions, 50% of firms upgrade the quality of tea grades and nearly 23% produce special tea grades such silver tips, golden tips, special and extra special tea grades. Two factories produce new tea grades name “Jayachakra” and “Sun Pekoe” which are unique to them. While, 15%, 4% and 2% of tea factories produce tea packets, flavored tea and green respectively. This implies that still all tea manufacturing firms are produce black tea in bulk form as their main product.

Regarding process innovations, 87% of tea manufacturing firms implement new machinery. While as new technology adoptions, 10% of tea factories upgraded the production process by fully automating the system, 10% implement new CTC production process in addition to existing orthodox production process, 7% utilize energy saving technologies and around 4% implement new weighing system to weight green leaf. Additionally, 46 % of firms adopted new management practices and 16% adopted strategies to reduce post harvest loss of green leaf especially during transportation. By adopting advance technology, the firm will able to gain benefits such as increasing efficiency, better allocation of staff, reduce production cost etc. [24].

Less number of tea manufacturing firms has adopted marketing innovation compare to product and process innovation adoptions. As marketing innovation adoptions; 5% firms do direct export and 10% are in process of direct export. Respectively 4% and 9% of tea manufacturing firms introduce their own brand to export market and local market. [17] Argue that adoption of innovation intend to increase the effectiveness and performance of the adopting firm. Since it facilitate the organizations to adopt the changing environment in order to sustain or increase the effectiveness of the firm.

4.3 Effect of EO on innovation

This section describes the empirical evidence on dimensions of EO and types of innovation of tea manufacturing firms in low country Sri Lanka. Table 1 presented the descriptive statistics of variables which were used for analysis.

Table 1 Descriptive statistics of variables

Variables	Min	Max	Mean	Standard deviation	Alpha value
Level of innovation adoption					
Product innovation	3	13	6.54	2.595	.912
Process innovation	3	15	8.48	3.111	.919
Market innovation	1	5	1.59	1.029	n. a.
Overall innovation	7	32	16.61	6.263	.832
Dimensions of EO					
Innovativeness	3	15	9.27	2.990	.720
Proactiveness	6	15	12.14	2.481	.783
Risk taking	3	15	11.54	2.949	.682
Size (Number of employees)	40	500	124.35	96.772	n. a.
Availability of GL [a]	238	277	258.19	14.464	n. a.

[a] Extent of tea cultivation in district / Number of tea factories in each district, n. a.; not applicable

Two stage hierarchical regression analyses were used to test the hypothesis 1 (H_1). In first stage control variables firm characteristics; size and availability of green leaf were entered as predictor's of types of innovation. Then, main effect predictor variables innovativeness, proactiveness and risk taking were entered and results are shown in Table 2.

The results revealed that innovativeness positive and significantly related to product, process, marketing and overall innovation of the firm. This implies that innovativeness significantly influence on different types of innovation and overall innovation of the firm. This finding in line with previous study of [11] which found that innovativeness in firms' culture positive and significantly influence on the number of innovations successfully implemented. This empirical evidence supports the theoretical argument that organizations adopted dynamic environment through innovation. Since, innovativeness of firm reflects the tendency to support new ideas, novelty and creative process [13].

Proactiveness show signs of firm's action about future want and needs of market place and try to obtain first mover advantage over competitors [13]. According to the results, proactiveness of the firm positive and significantly influence on process, marketing and overall innovation. It means proactiveness of tea manufacturing firms tend to enhance the process, marketing and overall innovation adoptions. Proactive firms assume probable future market needs and initiates actions that competitors respond [6]. However, finding reveals that relationship between proactiveness and product innovation is positive but not significant (coefficient = 0.114, $p \geq 0.1$). That implies proactiveness of tea manufacturing firm is not significantly increase the product innovation. As an industry, Sri Lankan tea industry is in mature stage and slow moving therefore it's not easy to create or adopt product innovation ahead of competitors.

Table 2 Regression analysis of dimensions of EO and innovation

Significant level *p < 0.1, **p < 0.05, ***p < 0.01

Dependents / Independents	Types of Innovation			Innovation
	Product	Process	Marketing	
Control variables				
Size (No employees)	.198*** (3.321)	.225*** (3.312)	.207*** (2.668)	.228*** (3.937)
Availability of GL	.115* (1.882)	.053 (.757)	.172** (2.165)	.102* (1.722)
Main effect				
Innovativeness	.545*** (7.743)	.423*** (5.277)	.312*** (3.409)	.487*** (7.134)
Proactiveness	.114 (1.542)	.232*** (2.762)	.260*** (2.706)	.205*** (2.866)
Risk Taking	.148** (2.226)	.128* (1.679)	.028 (.323)	.129** (2.001)
F Statistics	48.711***	32.761***	20.311***	52.972***
R^2	.703	.614	.496	.720
Adjusted R^2	.688	.595	.472	.706
Change in R^2	.394	.360	.221	.404

Risk taking behavior reflects firm's propensity to take strategic actions in face of uncertainty [25] such as investing new products or borrowing heavily. The results of Table 2 illustrated that risk taking behavior significantly related to product, process, and overall innovation of the

firm. That means risk taking of tea manufacturing firms have tendency to increase product, process and overall innovation adoption. Further, [26] also argue that risk preference of firms will pressure their propensity to learn more towards investigative innovation generation or innovation adoption.
The results revealed that dimensions of EO; innovativeness, proactiveness and risk taking significantly influence on innovation adoptions of tea manufacturing firms as predicted by hypothesis 1.

5. Conclusion

The purpose of this research was to investigate the different type of innovations adopted by tea manufacturing firms and examine how dimensions of EO influence on the innovation adoptions. When considering the different type of innovations adopted by tea manufacturing firms in Sri Lanka, most firms are adopted process innovation. While marketing innovation adoption is rated at lower with comparing to process and product innovation adoptions.
The results show the importance of dimensions of EO on innovation adoptions of tea manufacturing firms. Specifically, innovativeness is significantly influence on product, process, and marketing innovation. Proactive behavior of the firm positively related to the process and marketing innovation adoption. While risk taking of the firm positively influence on product and process innovation. Moreover, this result is in line with the arguments of [13] that EO reflects the extent which firm is engage in innovation. Further this result consists with findings of [27] that EO positively influences on innovation of the firm. Accordingly, product innovations enhance by innovativeness and risk taking behavior of the firm. Marking innovation adoption is facilitated by innovativeness and proactiveness while process innovation adoptions depend on all dimensions of EO. Therefore, it can be concluded that dimensions of EO namely innovativeness, proactiveness, and risk taking positively and significantly related to enhancement of product, process and marketing innovation adoptions of tea manufacturing firms under developing economic context of Sri Lanka.
This study contributes to existing literature in two ways; first, this providing empirical data on how individual dimensions of EO influence on different types of innovations. Therefore, this study indicates that three dimensions may vary independently. Secondly, research on entrepreneurship related to Sri Lankan tea industry is still at growing stage. Consequently, such contribution is vital to policy makers and managers to enhance the competitiveness of Sri Lankan tea industry by emphasizing on EO and innovation.
However, this study is subjected to several limitations that provide scope for future research. First, data were gathered from single source informant (owner / manager) in each firm. The underlying assumption behind this method is they are capable of providing opinions that reflect the company's behavior. Multiple informant approach would be adopted in future research. Second, this study is limited to low country tea manufacturing sector in Sri Lanka. Therefore, the current study is context specific and should be viewed cautiously when extended to other context. Further, current study context is consumer product. Therefore, additional research with related to industrial or service sector is needed to ascertain the generalizability of findings of this study. Finally, the cross-sectional data used in this study do not allow for causal interpretation among the variables used in the study. Although the study

has providing evidence in support of the hypotheses, longitudinal study may help to identify the direction of causality between variables. Due to the globalization process which has occurred over the past few decades, innovation in tea industry seems inevitable.

6. Managerial and policy implications

Due to high competition arising from newly emerging countries, tea manufacturing firms feel great competitive pressure and understand the importance of adopting innovation activities to gain competitive advantage. This study provides meaningful implication for top management to better understand how EO influences on innovation. Findings of the study show that improvement of different types of innovation is driven by EO of tea manufacturing firms under developing economic context. Therefore, firm could able to plan and implement innovation activities within the framework of these antecedents constructs.

Apart from its managerial implications, the empirical evidence could be useful for government and policy makers to design support programs and initiative of entrepreneurship and innovation for tea manufacturing firms. In tea manufacturing firms, minority had launched new product and generate innovation but majority are do innovation adoptions. Thus, the common view implies that tea manufacturing firms are less likely to focus extensively on research and development and generate innovations. Therefore, policy makers should encourage research and development in tea industry and focus on activities that facilitate transfer of knowledge among firms. Further, it is needed to promote research institutions to in line their research activities with current requirement of firms.

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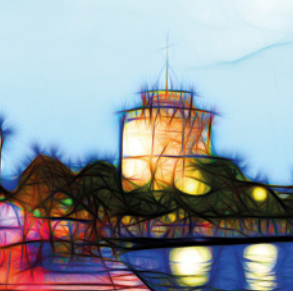

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FROM MOTIVES TO OUTCOMES. A PERSPECTIVE OF THE ROMANIAN SOCIAL ENTREPRENEUR

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The social entrepreneurs assume a business model which offers both social and economic value. Thus, the view of how this new category of businessmen view their role, responsibilities, and motivation in connection to sustainability may provide the basis for the analysis of other types of businesses. The present study investigates the motives of social entrepreneurs in Romania. It also highlights the perceived outcomes, and how networking and support has shaped their success. The in-depth interviews show that all social entrepreneurs have a professional background that supported their decision to get involved in the social enterprises. The motivations are both contextual and connected to a personal transformation of entrepreneurs. The network of support has been strong from the beginning - from the start-up and funding phase: which is highly valued. In terms of results and impact, the answers of our respondents range from the immediate small scale practical results to large systemic impact.

Keywords
Motives for Social Entrepreneurship, Social Entrepreneurs, Social Entrepreneurship in Romania

1. Introduction

The social entrepreneurs (SEs) take as a premise for their existence the social value that businesses must generate, a *prima faciae* role for their operations, equally important to making a profit [1] [2]. Thus, the view of how this new category of businessmen view their role, responsibilities, and motivation in connection to sustainability may provide the basis for the analysis of other types of businesses.

Social entrepreneurship is a relatively new concept, dating from the early 1990s, registering a significant development since [3]. The expansion could be related to the evolution of mentalities, society, and economies in the past decades. For instance, the decrease of the implication of the state in some social issues, as well as less effective action of the public organizations have made a place for social entrepreneurship. An increased interest and understanding of responsible companies might also have a significance in this process.

Martin and Osberg [4] define social entrepreneurship through three elements: (i) entrepreneurial context and opportunities, (ii) entrepreneurial characteristics of the initiators,

such as creativity, initiative, etc., (iii) entrepreneurial/ innovative outcome. Therefore, a social entrepreneurship endeavor is tightly related to the personality of the social entrepreneur, not only with the society in which the social entrepreneur operates.
The present study investigates the motives of social entrepreneurs in Romania. It also highlights the perceived outcomes, and how networking and support has shaped their success.

2. The Social Entrepreneur – A Brief Review

The literature review of Phillips et al. [3] shows that "*as change agents, social entrepreneurs harness innovation at a systemic level to bring about a change in social equilibrium*". The social entrepreneur considers the business framework in order to reach a social mission.

2.1 Typology of social entrepreneurs

SEs are perceived as entrepreneurs who care: courageous, restless, responsible, mission-driven, empathic, etc. Some are considered innovative and visionary. They resemble the model for the regular SMEs entrepreneur. However, Hemingway [5] adds to that specific personal and social values, as well as personal ethics which have a significant impact on the activity of the SEs. Both social and economic goals are relevant for an SE [6]. When discussing the values and motives for engaging in sustainability or CSR, Crișan and Adi [7] point out that one cannot ignore the spirit of the times. It is hard to believe that social entrepreneurship, at such scale nowadays, could have been witnessed in other epoch than the current one.

Zahra et al. [6] identify three types of social entrepreneurs. The social bricoleur is addressing local problems trough small scale activities and organizations, with limited resources. The social constructionist supply goods and services that public bodies or regular businesses cannot ensure. This type of SE might manage an organization either small or large, might act locally, nationally or internationally. The social engineer is a social innovator aiming to create new systems to address social needs, aiming social change.

Considering their background, there are two categories of social entrepreneurs: (i) a traditional entrepreneur with experience in the business environment; (ii) an entrepreneur coming from the public / social sector [8]. In the first situation, the profit – seeking is a target as important as the social outcomes. In the second case, the profit – making is relevant mainly from a sustainability perspective.

There are situations in which setting up a social enterprise is the result of a CSR program of a large corporation. Yunus [2] suggests that investing CSR money in setting out or supporting the setting out of social enterprises is a far better use of money than some other sustainability related project. Such a supportive program is *Made in Andrei's Country*, which constitutes the framework for the investigation in the last section of this paper.

2.2 Motives driving social entrepreneurs

Studies show that the perceived opportunity to reach a social mission is an important drive for social entrepreneurs, no matter the previous business knowledge and experience [3] [9] [10].

The opportunity is enhanced by the desire to following role models and previous experience in the field [9]. The motivation of social entrepreneurs is directly linked not only to the vision they have for their social business but also to the strategies approached [11].

A main reason for social entrepreneurship would be the desire to improve the well-being of a community considering a social, not an economic framework [12]. Connectivity and social networking are key elements in this approach. Literature presents a wide variety of motives to be a social entrepreneur: compassion [8] [13] [14], emotional reasons [8] [10] [14], personal connection to a social cause [8] [10] or past experience with a cause [9] [14] [15], desire to support a cause [8] [16], passion/interest for a subject [8] [9] [14] [16], public interest [8], altruism [9] [14] [17], helping people in need / society [6] [8] [10] [14], social justice [6] [10] [14], personal fulfillment/satisfaction [8] [10] [14], filling of usefulness [9] [10] and influence [14], accomplishment of something relevant [8] [10], conviction [18], frustration with a situation [14], innovation and creation [9], enjoyment [10], lifestyle reasons [19], acknowledgement [19], community development [6], and/or to be independent [14] [15]. Therefore, starting a social enterprise is a complex mixed result of inner- and outer-oriented reasons.

Social entrepreneurs are also motivated by the outcomes of their business. There is a mixture of wise business practices and responsible behavior which could lead to competitive advantages, such as lower costs, increased loyalty of employees, or better relationships with stakeholders. In addition, networking events could lead to increased organizational capabilities and stimulate innovation. In the case of social enterprises, Wiseman and Brasher [20], as well as Prahalad [21] reiterate the positive impact such local businesses have on the community well-being as a whole. Shepherd and Patzelt [22] present a wide range of outcomes related to sustainable entrepreneurship: economic gains, as well as non-economic gains to individuals and communities. Especially in developing countries, the benefits range from education, environmental protection, to better health and cultural development of individuals and society [22]. Local business districts, especially if they are involved in CSR activities, could have a significant impact on the complex development of those communities [23].

Networking is tightly related to social entrepreneurship, being of central interest to many studies dedicated to this phenomenon [3]. Networking is related with many aspects, from soft ones, such as morale of the social entrepreneurs, to hard ones, such as collective learning, effective management, access to finance etc. The members of the network could influence the success of a social entrepreneurial endeavor [24].

3. The Romanian social entrepreneurs between motives and outcomes

The literature shows the importance social entrepreneurs (SEs) place on having a strong connection to local communities, community involvements, being perceived as a community member and running a responsible business. At the same time, we have highlighted the importance entrepreneurs place on being part of a network although connections may not always be straightforward.

As Romania is a country which has adopted the free market only two decades ago while the communist regime has almost destroyed all traces of private property, it was important for us

to understand the view of Romanian social entrepreneurs about motives, operating conditions and the impact they may have when operating their business.

3.1. Methodology

We have turned to the social entrepreneurs which have been supported through the CSR program of the largest Romanian petrol company, OMV Petrom, called *Fabricat în Țara lui Andrei* (*Made in Andrei's Country*) in connection to the NESsT Foundation [25]. Each of the interviewed respondents have received up to 32.000 Euro from the program, support, training and technical assistance from this CSR program. One of the conditions for receiving the funding was to hire vulnerable persons from the community where they are operating.
As we were looking for in-depth information we have used as a method for data gathering the semi-structured interview. It had 3 interview sections: how their business started and why; the level of support they received in setting out and running the business; and finally the impact they have on the larger community.
We have interviewed our respondents face to face, and via email. Our respondents are M.C. (F, 57) who is involved in cold pressed oil, V.A. (F, 28) who produces wood bricks, and M.V. (F, 33) who produces toys based on children drawings. Our 3 respondents are female and all operate in Romania, 2 come from the rural area and 1 from the urban area.

3.2. Findings

At the set of questions related to the beginnings of the business, our respondents mentioned that being part of the *Made in Andrei's Country* program was a significant support for them. For one interviewee, this helping hand has been crucial, precisely because the political and economic context did not allow her to open a regular SME. Two of the respondents have not been at their first attempt to start a business (they both have converted their initial SMEs into social businesses as part of the CSR program). One of the respondents had a previous career in the non-profit sector and, due to the program, she decided to move from not-for-profit activities into a social company.

> *„I started as an entrepreneur with confidence in my capacity… unfortunately, the political context at the time had a bad influence on my business. I gave up to that business and I have started a new business…"* (MC, F, 57)
>
> *„I had no experience in social entrepreneurship, I was only helping people who were coming from vulnerable backgrounds… In the last 5 years, I have been involved in the activities of a local association, an NGO which is supporting former alcohol and drugs addicts."* (MV, F, 33)
>
> *„I have initiated this social business 3 years ago together with my father. We have been both involved in the community life and he had a business in the area of construction materials. More specifically, we are processing the wood into timber…"* (VA, F, 28)

In the case of this particular respondent, she enlarged the motivation towards a social dimension and mentioned that it was her intention to change the status of the business to a social one, due to a higher sense of service and responsibility she has felt towards the local community:

> *„My father is a member of the Local Council and I have been for a period councilor to the Mayor from Manesti. I wanted to get involved more in the community life"* (VA, F, 28).

The motivation expressed by another interviewee to set out her particular business is connected to a personal transformation she was going through:

> *„We all live in times when the food processing industry is passing a phase where it becomes excessively chemical due to processing and that is affecting our health. I have adopted a more balanced food consumption behavior.*" (MC, F, 57)

As mentioned, the initial support they have received as part of the CSR campaign of OMV Petrom has been consistent, both in financial as well as in know-how form. Two of the businesses have received 32,000 Euro (approx. 68% of the needed initial investment).

> *„In 2016 I have been declared winner within the* Made in Andrei's Country *competition supported by OMV Petrom and NESsT Foundation Romania. I have benefited from financial support, entrepreneurial education and drafting a business plan."* (MC, F, 57)

All three respondents went through the same type of support: 9 months of intensive training and preparation as well, having to face hard questions and decisions. But this type of program, which acted as a catalyst has not been the only kind of extra support they have received.

> *„As young entrepreneurs, there was always the possibility that we fail, but we had this support which has determined us to wish for the best. We had the support of the people from the community, especially because this is a business for the community. We have created 3 job placements for Rroma people, who had no income and large families…"* (VA, F, 28)
>
> *„The Town Hall has supported our activities from the beginning to finding a space in the village where we can do our activities, to finding the right people, our future employees from the vulnerable groups. When we have selected our employees, we held the interviews in the Manesti Town Hall building."* (MV, F, 33)

In terms of results and impact, the answers of our respondents range from the immediate results - people who have been hired from the communities and who received an income due to the business they have created; the medium level impact - the respondents help the local community with small services not available somewhere else, satisfy local consumption needs or purchase from other local business; and the large impact - the results or their businesses stretch beyond the limits of their communities towards the society at large, through education and courses or through encouraging in the community a more responsible and sustainable way of living, through passing their values further.

> *„We have hired initially 3 persons with an unlimited working contract… D. has experience in the textile industry and he has been appointed as head of the production, A. has been long term unemployed and a mother of one, while another one who was at that time 19 years old, had graduated only 3 classes; she has left us after a few months to work abroad. We still hire today D. and A."* (MV, F, 33)
>
> *„Our employees are happy that they have a job and that they can offer their families a decent living. They have understood the importance we give them and our desire to live in a clean environment… The people in the community are paying now more attention, we created this business also so they can understand that the deforestation is not a solution, that they have a friendlier alternative towards the environment and with a higher caloric power than wood…"* (VA, F, 28)

„We work sometimes as the village tailors, people from the community come to us to sew for them a hem, to shorten a pair of trousers and they pay very small amounts. We have been surprised to see that our employees have collected the money and they have bought things for the workstations, although we have set aside a budget for that. They said it was the right way to proceed." (MV, F, 33).

„For all our customers, we provide free courses in cultivating oily and aromatic plants as well as training session to pick with responsibility wild flowers and plants... We develop a series of educational sessions on nutrition for the population to promote healthy eating and we duly inform our clients about the benefits of cold pressed oil." (MC, F, 57)

Apart from problems some the businesses are experiencing (e.g. fluctuant cash flow within different year times), the respondents are happy and content that they can serve the communities and do it with a sense of pride:

„We have tied our soul to this community." (MV, F, 33)

4. Conclusions and discussions

As conclusions, we would like to underlie a few aspects that, in our opinion, shape a pattern of action for the investigated social entrepreneurs.

Firstly, all the social entrepreneurs interviewed have a professional background that supported their decision to become an entrepreneur. While two made a leap from a business to a social business, one moved from non-profit to for-profit. Their personal motivations are in the realm of education, ecology, and social support. Nonetheless, they have managed to transform their passions into a successful business operating for the greater good as pointed out by other authors [8] [9] [14] [16].

The network of support has been strong from the beginning - from the start-up and funding phase, until the very early operation, and a critical factor, in line with other findings [24]. The support has been provided by larger business entities (i.e. OMV Petrom), as well as state entities. In terms of results and impact, it is clear that the impact is foreseen beyond mere profit and it extends in one case further than the border of a village towards the supply chain and society as a whole.

From the examples above, we can conclude that in certain situations, where the socio-political climate has not been favorable to nourishing an entrepreneurial culture (i.e. former communist countries), this type of support offered by a big corporation as part of their strategic CSR initiatives (we stress the concept of strategic rather than small, isolated projects) can create a robust level of support for social entrepreneurs. This is just the first of the many layers of this model - the rest are connected to the personal motivation and resilience of the entrepreneurs, the support of local authorities where another type of local support is missing and winning the hearts of the community. This model which is based on Yunus's [2] practice in Bangladesh is also in line with the description of Martin and Osberg [4] as regards the social entrepreneurs.

Further research is needed to understand the main challenges faced by the SEs and see if they are contextual or common to other cultures. At the same time, a future research should investigate a larger sample, in order to contrast and compare different approaches used by different CSR programs or business angels. At the same time, we see scope for a transversal

research in order to understand the level of sustainability of SE and to what extent further support was required.

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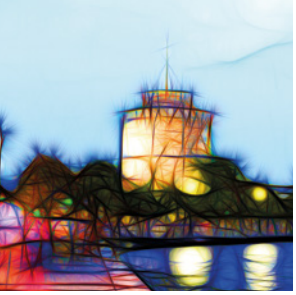

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START-UPPERS' PERCEPTIONS REGARDING COMPETITIVE ADVANTAGES: A RESEARCH OF THE GREEK START-UP ECOSYSTEM

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In the previous years, a rapid increase of start-up companies has been recorded in Greece. This is partly ought to economic recession Greece is currently undergoing. Start-ups' competitive advantage depends on a wide variety of factors relating to academia, industry, government and civil society constituting the quadruple helix innovation framework. This research aims to study and evaluate driving factors considered as critical to start-ups success focusing on Greece. The objective of this study is to outline the type, and location of operation of start-ups, the incentives for entrepreneurial activity. Furthermore, education, human resources, governmental services, funding, support and networking opportunities, provided by the four pillars of the quadruple helix framework are analyzed based on Greek start-uppers' perceptions. The data used in this paper were extracted from responses of 121 founders or co-founders of Greek start-ups from October 2016 until December 2016. A 5-point Likert scale was introduced to investigate the factors that affect competitiveness and performance of start-ups in Greece according to Greek start-uppers' perceptions. According to our findings the entrepreneurial motivation is explained mostly by means of entrepreneurial opportunity rather than necessity. Our research identifies the governmental and funding issues as the most important affecting the successful development and implementation of start-uppers. In specific public and private funding availability, positive economic environment conditions and funding received, regarding funding issues, and legal, bureaucracy, stability of the political environment, acceleration of starting procedures, fair taxation and organization of networking events, regarding governmental issues.

Keywords
Innovation, Quadruple Helix, Start-ups, Statistics

1. Introduction

A startup is a new business that incorporates the element of innovation in terms of products, services or organizational structures and processes, with the prospect of rapid growth [1]. Uncertainty, however, is a key feature of start-up entrepreneurship [2].
Especially, start-up entrepreneurship, which is directly linked to innovation, has additional positive effects on the economy. In the US, it has been found that start-ups contribute in creating new jobs and enhancing employability [3]. More specifically, it has been established that start-ups' jobs represent about 70% of job creation, having a critical impact on productivity growth [4]. In a survey of Hatliwanger et al (2012) [4] was found that start-ups, contribute disproportionately more to employment than established companies.
In Europe, the proportion of GDP raised by start-up companies, amounts to 9.5%. However, only 2.5% corresponds to the total number of jobs [5]. Nowadays, considering the impact of the recent economic crisis, promoting and encouraging start-up entrepreneurship is even more important [6].
Moreover, it has been argued that the start-ups contribute to regional development by encouraging innovation, accelerating institutional and structural changes, enhancing productivity and introducing new products and services on the market [7]. In a study of Wong et al (2005)[8] conducted on a sample of 37 countries, it was documented that businesses with strong growth potential exercise a very positive influence on GDP growth. Similar findings have been reported by Audretsch & Keilbach (2004) [9] in Germany.
Sustainability of start-ups is a measure that is affected by many variables associated with the motivation of the entrepreneur itself and the broader economic, cultural and social conditions. Overall, recent data in OECD countries show that the average survival rate of start-ups up to three years after establishing is equal to 60%, while the figures for five and seven years correspond to 50% and 40% accordingly [10]. The differences that exist between countries are explained by several factors related to the broader institutional framework of start-up entrepreneurship, highlighting the importance of the start-up ecosystem. The ecosystem concerns in all the relevant interest groups, including other companies, governments, universities, investors, independent professionals and support organizations. Without the contribution of these involved entities, the survival of a start-up company is almost impossible [11].
In this context, Triple Helix reflects a dynamic innovation and economic growth model, based on the dominant role of the university for the production, dissemination and application of knowledge, incorporating the creative renewal; resulting from the interaction between university, industry and government [12]. The hybrid model of the triple helix, emphasizes on building interdependent relationships between the three institutional entities and encourages mutually beneficial relations between them. In this way, innovation is the result of these interactions, and not the result of the stand alone government policy or of the industrial activity [13].

The Triple Helix model requires a new basis for the development of innovation, which is no longer produced by a single institution but by networking that is built between academia, industry and government [14]. According to this approach, the helices represent the dynamic relationships between individual factors, becoming more closely intertwined, resulting in a threefold structure. In this relational network, each of the three helices assume a specific role. Universities, as bearers of science, described as the dominant institution, whose role is considerably upgraded from the core activities of education and research [15].
Universities maintain a central role in the innovation process, generating knowledge within an interdisciplinary process, using and commercializing it, supporting the development of start-ups and undertaking various business functions [16], hence the term of "entrepreneurial university" [17]. These universities are actively involved in the capitalization of knowledge, playing a key role in the networking between different entities promoting innovation. Meanwhile, outside of higher education, the role of industry is similarly upgraded within the model of the Triple Helix.
As reported by Bellgardt et al (2014) [16], it is not just universities that develop entrepreneurship institutions, but also the companies integrate traditional academic functions, such as the creation of R&D departments, the education and professional development of the staff and the dissemination of knowledge with other organizations. From the above, it is clear that nowadays innovation is produced, utilized and implemented through interactions between the main institutions of higher education, business and the state.
Some researchers have suggested some variants of the Triple Helix model, in order to incorporate additional variables that affect the cooperation between public institutions, academia and the business world. Specifically, Carayannis & Campbell (2006) [18], based on the theoretical background of Etzkowitz & Leydesdorff (2000) [13] proposed the model of Quadruple Helix, which in addition to the three main institutions take into account the role of civil society.

2. Theoretical background

According the literature review, several variables have been proposed to explain the success of start-ups.

2.1 Education and Human Resources

Several studies have attempted to study the influence of skills and previous knowledge and experience of young entrepreneurs in input decisions and the subsequent return of start-up companies, some of them resulting in inconclusive findings [19].
According to Eckhardt & Shane (2003) [20], previous knowledge allows potential entrepreneurs to recognize market opportunities and to exploit in the best possible way, while a survey of Dahl & Reichstein (2007) [21] performed on a sample of start-uppers reported that the accumulated work experience of their founders positively affect their performance. Moreover, in a previous study by Robinson & Sexton (1994) [22] was found that education influences the success of entrepreneurship compared to prior experience, while recently

Shah & Smith (2015) [23], examining a sample of 1.427 start-ups operating in the sector of high technology, concluded that previous knowledge and experiences of young entrepreneurs limit their sustainability risks and increase the likelihood of success, and facilitate the accumulation and exploitation of new knowledge generated during the business activity.
Allen & Hall (2008)[24], exploring the perceptions of 100 start-uppers documented that those who have a higher education level are more likely to engage in innovative activities and to gain access to venture capitals. Similarly, Wadhwa et al (2009)[25], carrying out a survey of 549 business creators from various sectors, including aeronautics, health, ITC and services, found that entrepreneurs usually come from the middle class and have higher education while their activity was motivated by the need to create wealth, to be autonomous and exploit an innovative idea.

2.2 Funding

Financing of start-ups is an issue of particular research interest, as new innovative companies often have difficulty in obtaining funds while having limited cash flow during their early stages [26]. This is facilitated by the information gap that exists between new entrepreneurs and market investors, while innovation inherently is characterized by a high risk, thus preventing potential investors to finance these new ideas [27]. It should be also noted that entrepreneurs with previous working experience in start-ups, have increased opportunities to attract capital from official and unofficial sources, compared to entrepreneurs without previous experience (Kotha & George, 2012)[28].
The most traditional sources of funding of start-ups are personal funds, bank financing and funds from the wider family and friends. Kotha & George (2012) [28]propose the typology of 3F (Friends, Family, Fools) to determine these traditional sources of capital for young entrepreneurs. Moreover, new companies are being financed by private funds of their own founders, a practice known as bootstrapping, although in fact it is extremely difficult, due to the young age of those participating in start-ups. [29].
Moreover, bank financing is another traditional source of gaining capital for start-ups, though access to bank loans for young entrepreneurs with innovative ideas is extremely difficult. In a study of Brown et al (2012) [30]was found that the high-tech start-up companies rarely have the opportunity to finance their operation from bank funds, especially compared to other industries and companies, because of the high risk that characterizes the corresponding investment.
Arvanitis & Stucki (2014) [31] argue that the impact of venture capital on innovation activities and the success of start-ups is very important and even long-term. As Hsu argues (2004) [32], the funds of venture capitals have the greatest impact in promoting business innovation than any other form of financing.
Crowdfunding is a way to reduce the financing gap that occurs in the early stages of founding start-ups, as well as attracting venture capital is extremely difficult at this stage, encountering additional difficulties after the recent economic crisis [33]. According to Antonenko et al (2014) [34], crowdfunding was a direct response of the society to the financial crisis of 2007 to 2008 in the US, due to which bank loans, public and private funding were significantly decreased. Although this method shares common characteristics with other practices, such

as micro-financing, it represents a unique fundraising category, facilitated by the increasing number of websites that are offered for this purpose.

2.3 Government

The powerful impact of entrepreneurship in economic development of nations is an indisputable finding that has been noted by numerous researchers for decades [35]. The supportive role of the state in the broader ecosystem of entrepreneurship today is of special scientific interest and, indeed, it has been argued that the state may be involved in certain high risk sectors, in which the private sector systematically avoids to participate, thus creating global innovativeness markets actively [36]. According the European Confederation of Business Angels (Business Angels Europe - BAE), tax incentives are particularly useful for the development of the investment market and the promotion of start-ups in Europe.

2.4 Networking

The networking of a new entrepreneur who expects to utilize an innovative concept, refers to the overall relationship he develops with various institutions and agencies and is critical to the success of his start-up [37]. According to a survey of Walter et al (2006)[38], the performance of start-ups is directly affected by the quality of their networks and their ability to utilize the resources they have access through these relationships. Mort & Weerawardena (2006) [39] documented that the networking ability of start-ups facilitates knowledge-intensive products, allowing them to internationalize effectively.
The survival and success of start-ups depends directly on the efficiency of the ecosystem in which universities are key factor. Boh et al (2012) [40] report that universities nowadays operate essentially as incubators of entrepreneurship, allowing students to experiment in new innovative ideas that can be commercialized. In this context, the essential academic practices that encourage start-ups include the following: (1) mentoring programs offering guidance and counseling services to aspiring entrepreneurs, while providing linkages to other market participants, (2) entrepreneurship training, which aims to provide knowledge, to acquire entrepreneurial skills and shaping positive perceptions and attitudes to business [40]. One factor that is crucial for business intentions of graduates is entrepreneurship education, which aims to develop the business skills of students and to form the corresponding attitudes and views [41]. Entrepreneurship education is aimed at fostering entrepreneurship within undertaking integrated education policies aimed not only to graduates of economic schools but to all scientific fields. Katz (2007) [42]explains that there are four major types of business education. The first aims at raising awareness of students in entrepreneurship issues and in shaping positive perceptions. The second focuses on start-ups and addresses mainly to individuals with increased business interest, looking solutions to practical problems like creation and development of a new company. The third aims at graduates who already do business and want further networking and the last is a part of a broader context of lifelong learning.
In studies carried out on the impact of business education, it has been found that this critically affects the business intentions of graduates.

Lee et al (2005)[43], studying the influence of this type of education to students from universities in the US and Korea, concluded that entrepreneurship education is directly linked to their intentions to conduct business after graduation, improving their attitudes towards entrepreneurship and broadening their relative background knowledge. Similarly, Hattab (2014) found that students participating in entrepreneurship courses at the university are positively associated with increased business intentions and the improvement of their perceptions on entrepreneurial self-efficacy.

2.5 Incentives of start-up creation

The motives of young entrepreneurs play a crucial role in the growth potential of start-up companies. In this context, Decker et al (2014) [44] argue that there is a clear distinction between people who do business for the first time, which decisively affects their success.
As Hurst & Pugsley (2011) [45] point out, many young entrepreneurs in the US do not have high expectations for the development of their companies, as often they are motivated by personal reasons related to their desire to be autonomous and to have flexible working hours. Many times, the start-up entrepreneurship is an alternative to an uncertain career future faced by young people, especially in times of high unemployment [46]. In this context, it highlights the importance of distinguishing between entrepreneurial opportunity and necessity [47]. The main difference between them is that opportunity entrepreneurs are motivated by the perception that they have the ability to exploit an innovative idea and to be autonomous, while the latter are pushed from previous negative experiences of paid work and the lack of alternative employment opportunities [48]. Previous studies have documented that the success and sustainability of start-ups directly depend on that partition, as opportunity entrepreneurs usually have previous experience, are better prepared and have upgraded entrepreneurial skills and educational background, which helps them to cope with related challenges[49]. In a survey of Caliendo & Kritikos (2009) [50] in Germany, it was found that the opportunity motivated start-uppers' companies have significantly higher viability rates, than companies established out of necessity.
Similarly, Hessels et al (2008) [51], performing a triple distinction between necessity motive, independence motive and increase wealth motive, demonstrate that start-ups entrepreneurship motivated by the increase wealth motive, positively affects job creation, exports and economic growth of a country. Consequently, the investigation of start-uppers' incentives is particularly important to clarify the growth potential of start-ups, although it has been argued that these incentives are transformed in the process. Exemplary, according to Birley & Westhead (1994) [52], young entrepreneurs are initially motivated by their need to be accepted and autonomous, and from motives of personal growth and wealth creation, which do not significantly affect the success and sustainability of start-ups in long term.

3. Results

In this section a profiling analysis is conducted capturing both qualitative and quantitative start-ups' characteristics such as: number of employees, number of founders, sector, and location of the start-up.

In this section a selection of basic statistics that concern the functionality of start-ups in our sample is presented. Concerning the number of number of founders, 45.5% of start-ups consist of 2 founders, 24.8% of 3 founders, 18.2% of 1 founder, 9.1% of 4 founders, 1.7% of 5 founders while 0.8% of more than 5 founders (Figure 1).

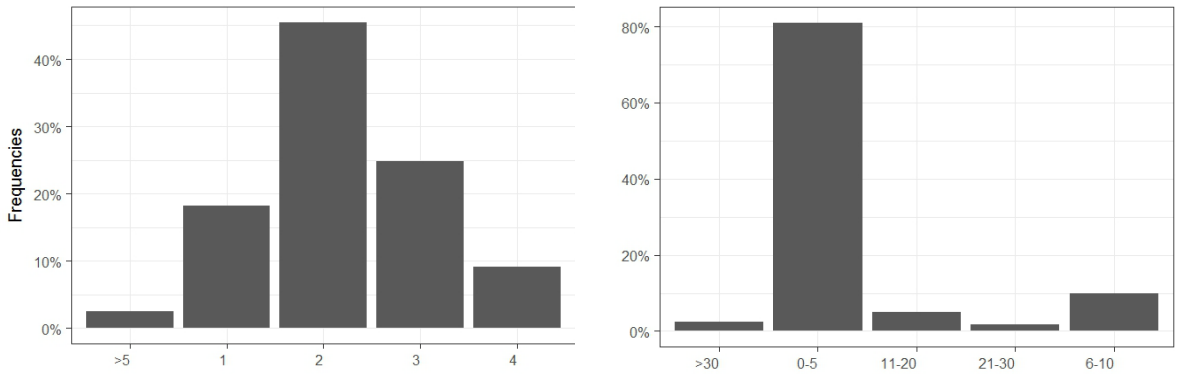

Figure 1 Frequency bar plots of number of founders (left) and employees (right).

Another finding concerning the functionality of a start-up is the number of employees. The majority of start-ups are small businesses with less than 5 employees (81%). Start-ups with labor force between 6 and 10 employees consist of 9.9% while only 2.5% of the population employee more than 30 employees as presented in Figure 1.The profile of start-ups examined in this paper cover a wide range of sectors. More specifically, the majority of start-ups (61.2%), work in the field of new technologies and especially in internet marketing and offsite optimization. The rest of the categories gather significantly lower percentages with 9.9% of start-ups working in tourism, 5.8% in education, 4.1% in trade, 3.3% in health services, 2.5% in transportation and agriculture, 1.7% in food & beverages and construction whereas, 7.4% work in other sectors. Finally, the descriptive statistics are concluded with the frequency analysis of the years of operations of start-ups. As can be seen in Figure 3, the highest percentages of start-ups are reported for start-ups with less than one year of operation and more than two years (28.9%). A small proportion of start-ups (14.9%) responded to be in the implementation phase.

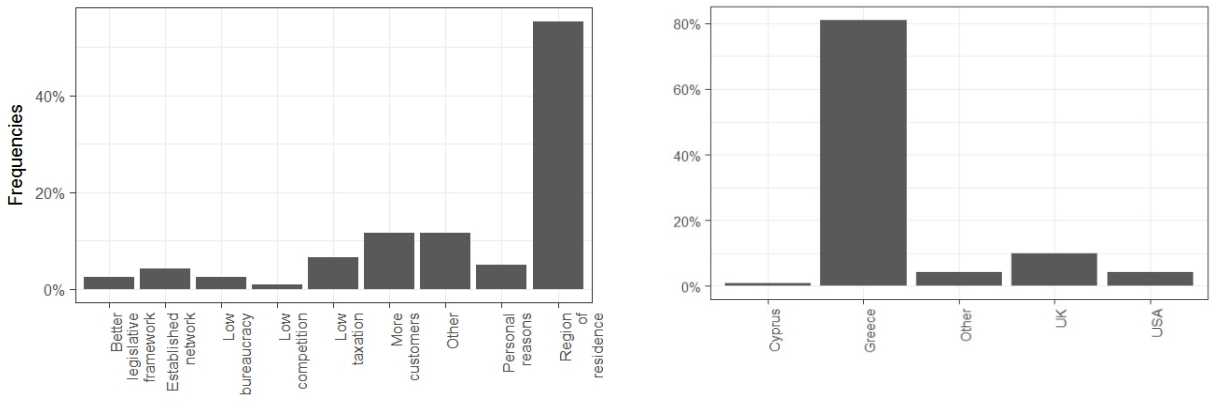

Figure 2 Frequency analysis of the location of choice for location (left) and location of activity (right).

Even if the start-ups that were selected are based in Greece, 89.3% of them will work with partners in Greece. On the other side, the activities of 46.7% of the start-ups are likely to work in Western Europe while 36.1% in Cyprus and South and Eastern Europe; 33.6% are likely to work in USA (Figure 2).

3.1. Analysis of Education and Human Resources aspect

According to literature, as described and analyzed in Theoretical Background section, there are many factors that affect the creation of a start-up from the fields of education and human resources. The analysis of these factors indicated that according to the start-uppers' opinions, one of the major factors that contribute positively to the success of a start-up is entrepreneurship education (76%). Also, another important factor that affects the success of a start-up is entrepreneurship courses by mentors in the relevant field (71%). Finally, the lifelong education of the personnel and the acquisition of new skills contribute positively to start-up success with 76%.

3.2. Analysis of Funding aspect

Funding is one of the most significant factors of a company as it guarantees its financial viability. Overall, start-uppers consider the adequate financial support as important with 68% (40% Extremely important, 28% Important). In addition the adequacy of funding sources is extremely important. Finally, a positive economic environment in accordance contributes positively in the success of a start-up according to the opinions of respondents with 62%.

3.3. Analysis of Government aspect

One of the biggest factors in the success of a company is the operations that concern the government and how these operations affect start-up success. Regarding the previous

issues, start-uppers consider that, in the case of Greece, a stable political environment does not affect significantly start-up success as 35% responded neutrally to this question On the contrary, one the most significant factors that affects directly the success of a start-up, is the acceleration of the procedures of the creation of a start-up company (67%). Also, the resolution of legal issues regarding spiritual property is considered as another significant factor that contributes to start-up success (59%). Finally, a fair taxation that would allow the development and growth of start-ups is by far the factor with major importance (82%).

3.4. Analysis of Networking

Regarding the factors that concern in the assistance from third parties, start-uppers consider support from specialist mentors as the most important. The positive responses concentrate 90%.Respectively support from universities respond to 37% while the same stems from research institutions. It is worth mentioning that 26% of start-uppers believe that cooperation with universities helps little or not at all, while the same percentage for research bodies is 19%.

Conclusions

In the years to come, start-up entrepreneurship will give a boost to the economy of Greece. Therefore, an analysis that would capture the factors that contribute positively and negatively to the growth and success of a start-up is needed. Five main aspects are recognized and analyzed namely education and human resources, funding, government and support. The proposed analysis has been conducted in Greece and responds from start-uppers have been statistically analyzed. Results shown that the majority of the start-ups have two founders and are based in Greece with less than five employees. From the analysis regarding the education and human resources the most significant component that has been identified to boost the growth of a start-up is entrepreneurship education and knowledge transferred from mentors. Regarding funding, start-uppers identify adequate financial support as one of the main aspects while regarding the issues that concern the transactions with the government, acceleration of start-up creation. Finally, regarding support and networking, start-uppers consider that knowledge transfer from universities of research organizations is highly important.

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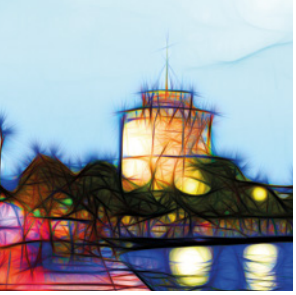

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DEVELOPING A STAGED COMPETENCY BASED APPROACH TO ENTERPRISE CREATION

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In this paper the authors will explore how educational frameworks applied in a university context can be devised to specifically support the development of entrepreneurial activity. Building on previous work (1-4), the authors will explore two frameworks to identify elements, which are useful and then develop these to propose a model, which, they believe, will support the facilitation of experiential entrepreneurship education. To achieve this the paper will propose a staged, process based approach to entrepreneurial education design which draws on the work of Kuratko and Morris, (5) to break the entrepreneurial effort into specific stages, or steps. The resulting framework provides an identifiable path for educators, researchers, managerial practice and quality assurance for the support of entrepreneurs and their businesses. In teaching, the approach should be structured around the frameworks to capture the full content of entrepreneurship as opposed to a more narrow focus on case studies, business plans, and other experiential exercises.

Keywords
Competencies, Enterprise Creation, Entrepreneurship Education, Entrepreneurship Theory, Entrepreneurship Typologies

1. Introduction

The definition of a broadly accepted set of entrepreneurial competencies is recognised as important (3,6,7) to support the development of specialist curricula at all levels of educational practice. Despite this, since the 2011, there have been surprisingly few peer reviewed articles seeking to advance or define these competencies into frameworks which might usefully operationalise them for educators. However, in the wider ecosystem, both national and transnational bodies have engaged in research projects and proposed frameworks (8,9) which may now find broad adoption across the sector as educators search for ways to validate their curricula (10).

This paper seeks to reinvigorate the discussion surrounding entrepreneurial competencies by exploring a number of these new frameworks to identify their central elements and search for consonance and dissonance between them. Then, using this information along with insights

from the literature and practice the authors will propose a staged framework (5) based on focal competencies (9) which will be presented here for consideration.

The authors believe that by doing so they can contribute important insights to the broader ongoing discussion surrounding the development of experiential entrepreneurial education programmes (10,11), their impact (12) and the ways in which university-based entrepreneurship programs, incorporating real-life venture creation, can bridge the gap (11) between entrepreneurship education and enterprise creation within the university environment.

2. Critical Literature Review

A number of researchers (13-18) have found value in the concept of 'competence' to support the structuring of entrepreneurial education programmes. The challenge, it would seem, is to create more accurate and reliable frameworks which capture a broad conception of competence and, in doing so, enable educators to create better programmes through which students can understand and explore entrepreneurial activity (3).

The first hurdle to overcome in achieving this goal is that the concept of competence itself is very difficult to define. Delamare Le Deist and Winterton (19) go as far as to say that the confusion surrounding the term makes it impossible to arrive at a definition which reconciles all the different ways the term is used; meaning that competence frequently becomes a 'fuzzy concept' used to bridge the gap between educational and job requirements (20,21).

In the UK education sector competence has generally become synonymous with occupational standards for education, as distinct from academic standards. The reasoning for this is complex but, at it's heart is the drive of successive UK governments during the 1980's to address endemic failures in skills based education through the establishment of a nation-wide, unified system of work based qualifications. The resulting occupational standards of competence were heavily grounded in a functional analysis of occupations (22) and the ability to demonstrate performance to the standards required of employment in a work context (23).

Entrepreneurial education, however, tends to adopt a more American application of the concept of competence; a behavioural approach associated with superior performance and high motivation (24) in which competence is defined as a mix of knowledge, skills, abilities and sometimes other attributes (25). This American view of competence has been heavily influenced by management theory in the 1980's and early 1990's (26,27) and HRM (particularly leadership, selection, retention and remuneration) in the late 1990's and 2000's (28-33). Meaning that competence, in this form, has a wide-ranging conception encompassing: knowledge, skills, attitudes, behaviours, work habits, abilities and personal characteristics (19).

This broad definition of competence is widely applied (3) but, it has been suggested by Hayton and McEvoy (34) that in doing so a further level of confusion arises from the indiscriminate use of terms such as skills, knowledge, and abilities, alongside competence. Their position is that the unique characteristic of competence is that competencies are interactional constructs. In other words, they have three parts: individuals' differences, situationally defined behaviour, and socially designed criteria for performance. Competences

are distinct from knowledge, skills, and abilities in that they are not only attributes of individuals, but also depend on situation and social definition.

These debates contribute to a range of ontological confusions surrounding the use of the term competence in an educational context; the scope of which might render the term almost meaningless. Nevertheless, by drawing on a range of elements from the literature (3,25,34-36) the authors believe that a useful definition is possible. In this conception competence is interpreted as a holistic typology combining: knowledge (and understanding), skills, attributes and behaviours. These elements are not considered to be static but, instead, depend on context and interaction reflecting the 'total ability of the entrepreneur to perform a job role successfully' (15). To set these apart given the aforementioned confusions they will be referred to as focal competencies (borrowing from Bacigalupo et al., (9) reflecting their importance as key moments (37) in the entrepreneurial journey.

These focal competencies, once identified, will then need to be operationalised in a framework, this poses the next set of challenges; Mitchelmore and Rowley (7) suggested a competency framework, comprising four categories: entrepreneurial competencies, business management competencies, human relations competencies and conceptual and relationship competencies. Churchill and Lewis (1) proposed a five stage model based on the critical issues which face the business owner, looking at the internal characteristics of the business (2,39). Draycott and Rae (3) identified a range of frameworks which, while possessing some core similarities employed a number of different strategies and, generally disregarded the need for the competencies to develop over time (38) or relate to a particular context (13,25,40) or stage of development (5). From this discussion it has become clear that the required competencies will be based on the entrepreneur, the business situation (stage) and the education context.

To clearly identify the knowledge, skills, attributes and behaviours which these focal competencies will need to reflect it is imperative that a precise definition of entrepreneurship is available to underpin them.

The (8) definition of entrepreneurship which is widely used in UK higher education is focused on 'the application of enterprise skills specifically to creating and growing organisations in order to identify and build on opportunities'. The definition is comprehensive but, it reflects a narrow view of entrepreneurship as the creation of organisations. The authors, however, believe that this perspective is unhelpful given the broad application of entrepreneurial endeavour evident in the economy as whole. Instead, building on the work of (41-46) they define entrepreneurship as 'finding and developing opportunities to create value.' This value centric view of entrepreneurship allows for a more holistic interpretation of the term especially in reference to creative and social entrepreneurship.

Furthermore, this definition in conjunction with the paper's application of focal competencies means that entrepreneurship is firmly grounded as a 'processual phenomenon' (47:p.30) that locates entrepreneurs in a contextual framework of 'events, circumstances, situations, settings, and niches'. The approach means that the entrepreneurial effort will be broken down into specific stages, or steps. Although these stages may overlap and, one may have to periodically revisit an earlier stage to move forwards, they should evolve in a logical progression leading to the growth and development of the entrepreneur (25).

3. Methodology

From the literature reviewed it is clear that focal competencies will include a complex range of elements linked to the authors definition of entrepreneurship. These elements will need to be broad enough to be grounded in a range of contexts and flexible enough to develop with the student as they learn and grow. In addition to this they will need to function within a non-linear construct allowing the student to explore the topics visiting and revisiting them as necessary as part of their personal journey.

To identify these elements the authors have selected two frameworks, the QAA Enterprise and Entrepreneurship Education: Guidance for UK Higher Education Providers (8) and EntreComp: The Entrepreneurship Competence Framework (9) which have emerged since (3) reviewing them to identify:

1. The competencies they employ;
2. The similarities and differences between them;
3. Which of these are 'focal competencies'; and
4. If / how they address the development of competencies over time.

QAA: Enterprise and Entrepreneurship Guidance

The QAA (8) states that both enterprise and entrepreneurship education should focus on equipping students and graduates to develop their overall effectiveness beyond the traditional educational setting. The student journey through enterprise awareness, the entrepreneurial mindset and entrepreneurial capability provides a pathway using both in-curricular and extracurricular evidence, also discussed by Rae, Matlay, McGowan & Penaluna, (6) to create an entrepreneurial pathway for the student to follow without giving a prescription for the exact way this should be achieved.

While the framework does not talk about competencies, it does provide a series of enterprising behaviours, attributes and skills; showing how these can be mapped onto the development of enterprise awareness, the entrepreneurial mindset, entrepreneurial capability and effectiveness. It expects students not to approach their learning in a linear fashion; rather their journey may pass through different stages in an iterative fashion and also allows the student to engage with different stages simultaneously.

EntreComp: Entrepreneurship Competence Framework

The Entrepreneurship Competence Framework (9) aims to establish a common reference framework and consensus around entrepreneurship competence by defining 3 competence areas, a list of 15 competences, learning outcomes and proficiency levels. The 3 major competence areas are: 'Ideas and opportunities', 'Resources' and 'Into action'.

The framework provides a comprehensive list of 442 learning outcomes, reflecting the complexity of the entrepreneurship. These learning outcomes offers an insight for those designing and applying the topic into curricula. It does however state that the framework has not yet been adapted to, or tested in real settings. The 15 competencies also fit within a progression model (level 1 to 8) which demonstrate higher levels of expertise and reflect the development of the student over time.

There is a considerable degree of overlap between these two frameworks. As an example looking at the first stage of entrepreneurship, the opportunity recognition process. The QAA

(8) competency set contains 'Opportunity recognition, creation and evaluation' while the Entrepreneurship Competence Framework (9) contains 'Ideas and opportunities', 'Spotting opportunities', 'Creativity', 'Vision', 'Valuing ideas' and; 'Ethical and sustainable thinking'. In short, the newer framework deals broadly with the same issues but, encompasses a greater degree of granularity in the way it addresses them. Furthermore, while the QAA framework seems geared towards developing the student for either enterprise and/or entrepreneurship the EntreComp is primarily looking at developing entrepreneurial activity as it's core output.

In total these two frameworks encompass 37 competencies, many of which exhibit the same degree of overlap. For the sake of brevity the authors have chosen to present these in a table (Table 1) in which the competencies can be categorised, sorted and key focal competencies identified.

To do this the authors needed a system of categorisation; from a review of the frameworks and the broader literature (1,5) it became apparent that a number of identifiable stages might exist onto which the competencies could be mapped. The first five stages which emerged were: Discovery, Modelling, Startup, Existence and Survival. These are reflected in the competencies set out in the two frameworks. It is considered that the first three stages bring about a robust business idea and formation which are core developments within an educational setting while the last two develop the venture and the entrepreneur into viable business and professional entrepreneur.

In the table each competency has been grouped into one of the five categories. Building on previous work in developing enterprise creation frameworks (1,5) this grouping has been based upon the competencies meaning (3), context, fit to the developmental stage and potential outcome (13,40,48). This allows overlapping elements to be clearly visible and makes it simpler to identify the key focal competencies. The focal competencies have been identified based on the author's previous definition and will be used in the next section to help illustrate how the stages could be populated to create functional framework.

4. The Stages of Enterprise Creation

Based on the mapping of competencies against the emergent stages of enterprise creation it quickly became apparent that this methodology could present a staged framework for enterprise formation. However, it was also obvious that five stages might not provide enough opportunity to express the breadth and depth of the entrepreneurial process.

As a result an additional four stages (Success, Adaption, Independence and Exit) were identified from the literature (5,49). These final elements complete the model by focusing on the success of the business, how the entrepreneur progresses beyond the business, their separation into different entities and the entrepreneurs eventual exit.

For each of the nine stages the authors then used the focal competencies to create 'value statements' describing the stage and it's key elements. These statements were then used to shape a final presentation which combined the focal competencies and the stages into a fully realised framework (Table 2). The value statements and, by extension, the framework they represent, while organised in a linear fashion do not necessarily have to operate as such. This choice has been made by the authors for simplicity and ease of presentation. Instead,

each of the statements represents a point in a journey which students can visit and re-visit as necessary (6,50).

Stage 1 - Discovery

This stage is centred around the focal competency of opportunity recognition, creation and evaluation (8) and (9). These are the processes by which entrepreneurs identify and evaluate potential new business opportunities. An opportunity by definition is a favourable set of circumstances which creates a need for a new product, business, or service (45, 51, 52). Opportunity recognition is the process by which the entrepreneur comes up with a prospective idea for a new venture. Evaluating the opportunity takes research, exploration, and understanding of current needs, demands, and trends from consumers and others. The process of researching and surveying allows the product or service idea to develop, so that it can be modelled.

Stage 2 - Modelling

The second stage is about developing the business logic to create a business model. This is split into three parts and starts by setting out a Strategy, formulating a business model and setting the business processes to achieve the strategy (49, 53). These form the key elements for the plan to start the business and, are an integral piece of submitting any proposal for an entrepreneurial or intrapreneurial business (54). The model should be underpinned by the resources available and those which may still need to be secured. Resource allocation and availability are extremely important to startups because sustainability and profit (not loss) depend on proper planning and understanding of the internal and external environments.

Stage 3 - Startup

The fourth stage is starting the enterprise (2). Once the resources detailed in the business plan are mobilised the entrepreneurial process can be effected and implementation can take place. In this stage the business may be trading or begin to research or develop a product. The aim of this stage is to have the processes in place so that the business can have a scalable, repeatable and profitable business focused on distinct customers within an identified market.

Stage 4 - Existence

At this stage the business has two core focuses; to gain enough customers to create a profitable business and, at the same time establishing production or product quality. The majority of businesses fail at this stage due, in part, to either one or both of these factors. At this stage the organisation is a simple one, the entrepreneur does everything and directly supervises subordinates, who should be of at least average competence. Systems and formal planning are minimal to nonexistent. The company's strategy is simply to remain alive (16) which requires the focal competency of tolerance of uncertainty, risk and failure

Stage 5 - Survival

At this stage the business should be a viable entity in terms of cash flow and resources, it has enough customers and satisfies them sufficiently with its products or services to gain repeat sales. The organisation is still simple. The company may have a limited number of employees supervised by a junior manager or supervisor. Neither of them makes major decisions independently, but instead carries out the rather well-defined orders of the entrepreneur. Formal planning is, at best, cash forecasting. The major goal is still survival, and the

entrepreneur is still synonymous with the business. The entrepreneur starts to implement ideas through leadership and management which provides opportunities to scale.

Stage 6 - Success

Entrepreneurs at this stage have a number of options: capitalise on the company's accomplishments, expand or, keep the company stable and profitable. The entrepreneur has a number of ways to capitalise, from exit to taking a 'founders dividend' from the business. If the entrepreneur want to expand (37,40) then the core tasks are to make sure the basic organisation stays profitable so that it will not outrun its source of cash and, to develop managers to meet the needs of the growing organisation. Through the entrepreneurs leadership all managers within the business should now identify with the company's future opportunities rather than its current condition demonstrating a success to its stakeholders.

Stage 7 - Adaptation

Businesses which reach this stage normally have a number of factors pushing them to adapt, these are normally grounded in changes either to the micro or macro environments. Businesses at this stage will normally be entering a phase of rapid change and will have to have secured the required finances to develop. At this point key management is in place with a set of operational systems. Operational and strategic planning are now a key focus. The organisation is decentralised and, at least in part, divisionalised. The key managers must be very competent to handle a growing and complex business environment. The systems, strained by growth, are becoming more refined and extensive. Both operational and strategic planning are being done and involve specific managers. The entrepreneur and the business have become reasonably separate, yet the company is still dominated by both the entrepreneur's presence and stock control.

Stage 8 - Independence

A business at this stage should now has the advantages of size, financial resources, market share and managerial talent. Innovation and Intrapreneurship (55) are now key factors in keeping the business in market position. The organisation has the staff and financial resources to engage in detailed operational and strategic planning. The management is decentralised, adequately staffed, and experienced. Business systems are extensive and well developed. The entrepreneur and the business are quite separate, both financially and operationally.

Stage 9 - Exit

At this stage the entrepreneur is focused on exiting the business and making their separation permanent. An exit strategy will give the entrepreneur a way to reduce or eliminate their (49) stake in the business and, if the business is successful, make a substantial profit. This stage removes the entrepreneur from primary ownership and decision-making structure of the business. Common types of exit strategies include Initial Public Offerings (IPO), strategic acquisitions and management buyouts. The organisation at this stage is generally profitable, has a definable set of resources with a clear and realistic strategy to continue. The CEO and founder(s) are separate.

5. Conclusions

This paper, while limited in its scope, set out to reinvigorate the discussion surrounding entrepreneurial competencies by providing a tightly constrained study reviewing two existing frameworks and a broad range of elements from the literature.

This is important because, as highlighted by Leitch (56), it is only by significantly increasing skills levels that the UK (given its economically uncertain future) will improve its productivity; crucial skills are identified as leadership, management and innovation, which drive productivity-led growth; or to put it more directly entrepreneurial focal competencies that can marshal the factors of production.

The key findings for this paper were that focal competencies are not only definable and, identifiable but they can also be mapped against a series of emergent stages (of enterprise creation) to provide a operationalised framework which meets the challenges more broadly highlighted in the literature.

In doing so the paper also provides an insight into the focal competencies which could be incorporated when designing curriculum for experiential entrepreneurial education programmes and how this could be staged based. These focal competencies are a key aspect of the education programme when considering the development of both the entrepreneur and their venture at each stage.

It is the hope of the authors that this paper provides educators with an original position on the dynamic nature of entrepreneurial competencies, their selection and operationalisation, which, may be especially useful for those who lead university-based entrepreneurship programs, incorporating real-life venture creation. It is also hoped that this leads to further discussion on the topic and, an increase in co-operation between researchers and educators to explore this topic as a potential method for providing more grounded curricula, especially given the challenges highlighted by (12).

Although this paper was limited in its scope it has highlighted a number of additional research themes which merit further reflection, namely:

- This research has centred on the two competency frameworks of the QAA and Entrecomp. There are other competencies frameworks which if mapped may provide better focal competencies.
- Further research will be needed to ensure this has a positive influence for the entrepreneur. It can also be extended to mapping the managers, supervisors and employee competency to each stage of the business, thereby looking at ways to optimise the business strategy.
- Research into which competencies are focal and the required pedagogical practices which provide a significantly increased efficacy/impact of entrepreneurship education.

Appendix

Table 1: Competency Mapping

Framework	Competency	Discovery	Modelling	Startup	Existence	Survival
EntreComp	Spotting opportunities	✓				
EntreComp	Vision	✓				
EntreComp	Valuing ideas	✓				
QAA	Understanding what enterprise means to me	✓				
QAA	Opportunity recognition, creation and evaluation	Focal				
QAA	Personality and social identity	✓				
EntreComp	Ethical and sustainable thinking		✓			
EntreComp	Self-awareness and self-efficacy		✓			
EntreComp	Financial and economic literacy		Focal			
QAA	Ambition, motivation & goals					
QAA	Self-discipline & personal organisation		Focal			
QAA	Personal values: ethical, social & environmental awareness		✓			
EntreComp	Taking the initiative			✓		
EntreComp	Mobilising resources			Focal		
EntreComp	Mobilising others			✓		
QAA	Independent self-direction			✓		
QAA	Implement enterprising ideas			✓		
QAA	Generate business and career options			✓		
QAA	Undertake new venture creation			✓		
QAA	Identify and approach target markets			Focal		
QAA	Personal confidence and resilience			✓		
EntreComp	Creativity				✓	
EntreComp	Coping with uncertainty, ambiguity and risk				✓	
EntreComp	Motivation and perseverance				✓	
QAA	Creativity & innovation				✓	
QAA	Decision-making supported by critical analysis & judgement				✓	
QAA	Reflection & Action				✓	
QAA	Appreciate and create multiple forms of value				✓	
QAA	Tolerance of uncertainty, risk and failure				Focal	
QAA	Go beyond perceived limitations to achieve results				✓	
EntreComp	Planning and management					✓
EntreComp	Working with others					✓
EntreComp	Learning through experience					Focal
QAA	Implementation of ideas through leadership &					Focal

	management	
QAA	Interpersonal skills	✓
QAA	Communication & strategy skills	✓
QAA	Progress individual goals & approaches	✓

Table 2 The Final Framework

Stage	Discovery	Modelling	Startup	Existence	Survival	Success	Adaptation	Independence	Exit
Description	This stage is centred around opportunity recognition. These are the processes by which entrepreneurs identify and evaluate potential new business opportunities.	At this stage the entrepreneur begins to operationalise the opportunity by creating abstract models to test key hypotheses.	A new business venture in its first stages of operations, either has started trading or developing resources with the aim of trading.	These businesses have two issues to master, gaining enough customers and stabilising either production or product quality.	A viable business entity in terms of cash flow and resources, it has enough customers and satisfies them sufficiently with its products or services to keep them.	Entrepreneurs at this stage have two options: capitalize on the company's accomplishments and expand or keep the company stable and profitable.	The business is set to grow rapidly and has secured the required finances. Key management is in place with a set of operational systems. Operational and strategic planning are now a key focus.	The business now has the advantages of size, financial resources, market share and managerial talent. Innovation and Intrapreneurship are now factors in keep the business in market position.	The shareholders want to release the value in the business. Common types of exit strategies include initial public offerings, strategic acquisitions and management buyouts.
Enterprise Development	At this stage the enterprise is only a set of ideas.	A formalised model of the enterprise, it's goals, reasons they are attainable, and plans for reaching them.	The organisations core processes will be geared to the refinement of a scalable, repeatable and profitable business model.	The organisation is a simple one, the entrepreneur does everything and directly supervises subordinates, who should be of at least average competence. Systems and formal planning are minimal to nonexistent. The company's strategy is simply to	The organisation is still simple. The company may have a limited number of employees supervised by a supervisor. Neither of them makes major decisions independently, but instead carries out the rather well-defined orders of the entrepreneur.	Core tasks are optimised to ensure the basic organisation stays profitable and is able to meet the needs of the growing organisation. Managers identify with the company's future rather than its current condition. Systems are installed to ensure strategic planning and business oversight.	The organisation is decentralised and, at least in part, divisionalised. The key managers must be very competent to handle a growing and complex business environment. The systems, strained by growth, are becoming more refined and extensive.	A organisation in this stage has the staff and financial resources to engage in detailed operational and strategic planning. The management is decentralised, adequately staffed, and experienced. Systems are extensive and well developed.	The organisation is profitable, definable with a clear and realistic strategy to continue. The CEO and founder are separate. The senior management team have good retention packages.

Entrepreneurial Development	Opportunity recognition represents one of the most important early aspects of entrepreneurship.	The nascent entrepreneur can see that the concept provides either: a good marketable opportunity, a protectable idea, and/or a favourable cash flow forecast.	The entrepreneur's role is to build a product customers want to buy; recruit a team; find funding from customers, partners, or investors; and overall prioritization of work.	remain alive.	Systems development is minimal. Formal planning is, at best, cash forecasting. The major goal is still survival, and the entrepreneur is still synonymous with the business.	The entrepreneur consolidates the company for business sustainability. If expanding then the entrepreneur establishes the borrowing power of the company and risks it all in financing growth.	Both operational and strategic planning are being done and involve specific managers.	The entrepreneur and the business have become reasonably separate, yet the company is still dominated by both the entrepreneur's presence and stock control.	The entrepreneur and the business are quite separate, both financially and operationally.	An exit strategy gives a business entrepreneur a way to reduce or eliminate their stake in the business and, if the business is successful, make a substantial profit.
Focal Competency	Opportunity recognition, creation and evaluation	Financial and economic literacy. Self-discipline & personal organisation.	Mobilising resources. Identify and approach target markets.	Coping with uncertainty, ambiguity and risk. Tolerance of uncertainty, risk and failure.	Learning through experience. Implementation of ideas through leadership & management.	Operational & Financial planning.	Investor Management. Delegation.	Mental ability to coordinate activities.		Negotiation. Merger and acquisition.

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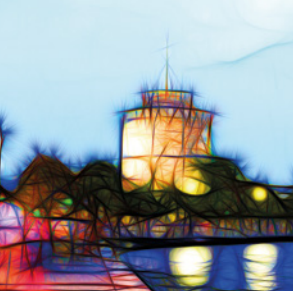

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A UNIQUE TECHNOPARK FROM TURKEY: BILKENT CYBERPARK & ITS VALUE-ADDED SERVICES' RESULTS

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Entrepreneurship is a pivotal point in economic growth and therefore developed economies implement programs to foster entrepreneurial activities. A contemporary initiative is STPs (Science and Technology Parks) which have been established back to 1970s. STPs are a valuable source of innovations which aim to provide their customers various value-added services such as: business development services, co-operation in programs and projects, key contacts and network connections. Furthermore, STPs launch programs like accelerator and cluster programs in order to support the growth of their companies both in the domestic and foreign market. Within the scope of this paper, we attempt to highlight the importance of an STP in providing a strong economy and improved quality of life. The example we bring forth is that of a unique technopark from Turkey; Bilkent Cyberpark which is one of the biggest and leading STPs in Turkey. With 6 research centers, over 240 companies and over 3.500 R&D personnel, Bilkent Cyberpark therefore is the "right mix" of research excellence and entrepreneurial activity.

Keywords
Development, Enterprise, Entrepreneurship, Technopark, Value-added Services

1. Introduction

Developed economies have been setting up projects to plan and build science and technology parks (STPs) since 1970s. These parks have not only fostered economic development but also facilitated innovation at local and international levels [1]. According to United Nations Educational, Scientific and Cultural Organization (UNESCO), there are over 400 STPs available worldwide and their number is still growing.

In Turkey, first STP (or technoparks) establishments have been started in 1990's and the legal framework regarding the technoparks completed in 2001 with the enactment of Technology Development Zones Law (No. 4691). As of October 2016, 64 technoparks are located in different cities in Turkey; 51 are operational whereas the remaining 13 is under construction. According to the statistics, there are 4.217 companies located in the technoparks and 29.317 projects [2].

Entrepreneurship is one of the most outstanding drivers of the growth and wealth in the contemporary global economy and it is widely viewed as a key aspect of economic action. Turkey, a developing country with a young population and lots of potential, is aware of the fact that innovation and entrepreneurship have become the primary drivers of economic growth. Ankara has well-established industrial zones, strong sector clusters, international agencies and non-profit or civil society organizations with a very young population as well. With 18 universities, Ankara is the second region with highest number of universities.

Figure 1 Bilkent Cyberpark

Bilkent CYBERPARK was founded in 2002 jointly by Bilkent University, which is Turkey's first private university, and its affiliate Bilkent Holding. Bilkent CYBERPARK with 15 buildings, approximately 110.000 square meters of indoor area, 6 research centers, over 240 companies and over 3.500 R&D personnel is one of the biggest and leading STPs in Turkey.

Today, STPs provide their customers various services. They should create an innovative operating environment that encourages growth, business development services, co-operation in programs and projects, key contacts and network connections. Furthermore, STPs should support the production, commercialization and more significantly internalization of technology-intensive businesses and foster growth of companies. Nowadays within these value added services, internalization is very popular subject in Turkish STP ecosystem. Most of the STPs design clusters or accelerator programs in order to support their companies in the foreign market penetration attempts and boost their export activities along with mentoring and networking support.

Bilkent CYBERPARK's aim is to help start-ups and small enterprises deal with difficulties in the early stages and to foster mature companies' export activities in the foreign market. For this aim, it always provides value-added services together with high quality office space and facilities to achieve its mission which are being addressed to build a guiding environment to technology based enterprises.

Figure 2 2016 Technology Development Zone Performance Index Award Show held by Ministry of Science Industry and Technology

2. Internationalization and Acceleration Programs

2.1 Bil-Tel Cluster

Bilkent CYBERPARK established Bil-Tel Cluster as a result of joining together its incorporated businesses. Bil-Tel Cluster is one of the prestigious clusters of Turkey and will greatly contribute to Turkey's Information and Telecommunication Sector. It is funded by Turkey's Ministry of Economics UR-GE declaration. Becoming a cluster means a lot to CYBERPARK ICT Cluster with the advantage of common training, consultancy, projects, lobbying activities and trade. Game, Animation, and Virtual Reality, 3D Development Software, Retail Supply Chain Solutions, Social Media Data Mining, Geographic Information Systems, Telecommunication and Services, Customized Applications, M2M Solutions, Embedded Software and Various Management Systems are some of the products of CYBERPARK ICT Cluster. Up to now, Bil-Tel ICT Cluster members have attended many international B2B matchmaking events organized by Bilkent CYBERPARK Administration to commercialize their products internationally. By attending Ethiopia Business Forum, Silicon Valley Trade Delegation and Malaysia-Kuala Lumpur Business Forum; cluster members had a chance to meet up their potential customers, partners and distributors. In two well designed matchmaking activities at foreign markets, there were more than a thousand B2B meetings with potential partners at international level.

Figure 3 Bil-Tel ICT Cluster Members in Malaysia

2.2 CAP

CYBERPARK Accelerator Program (CAP) is a joint collaboration Program between Bilkent CYBERPARK in Ankara, Turkey and Innosphere (RMI) in Fort Collins, Colorado USA. CAP is a 16 week long – mentorship heavy – customized business development bootcamp for ICT companies wanting to penetrate the US market. It has been awarded among the Most Innovative Solutions contest of International Association Science Parks and Areas of Innovation (IASP) in 2015. Last year CAP enrolled 7 ICT companies. Each participant finished the program with improved internationalization capacities, pivoted business plans and revenue models, greatly improved sales pitches, a network of investors and industry representatives, a better planned agenda for their US penetration journey, an objective assessment of their value proposition, to-do list for their business plans. Moreover, each company received 60 hours of mentorship. In total, more than 30 company meetings were arranged.

All the participants had the chance to pitch to 10 different investors. One of the attending companies established path to FDA approval and USA pilot launch; one validated market assumptions (STEM) and secured USA pilot; another one developed operating/legal strategy for expanding customer base in USA without establishing a US entity. The outcomes of the program for each participant are invaluable but the greatest success story belonged to a CYBERPARK company named Do Major. Do Major's product mychordbook partnered with Optek Music Systems, a US based company that manufactures Fretlight Guitars. MyChordBook started supporting Fretlight Guitars [3].

Figure 4 CAP in Colorado (USA)

3. Pre-Incubation and Incubation Services

In addition to internationalization and acceleration programs, Bilkent CYBERPARK has pre-incubation and incubation services. These programs provide value added services which can help to minimize its tenants' changing problems due to internationalization and changing economic environment. In general, it can be said that the most value added services are networking, training, legal advisory, business model verification and management consultancy. It is essential to assess how incubators for entrepreneurship development are and in the wider business world in general, and how STPs meet the needs and wishes of clients and stakeholders as well [4].

3.1 BIGG MARKA Program

One of the pre-incubation programs is BIGG MARKA which provides training and one-to-one-1 mentoring sessions which aim to convert entrepreneurs' business ideas into successful business plans for entrepreneur candidates. For this scope, in every year, during 2 months Bilkent CYBERPARK hosts a series of training and mentoring sessions for 100 young entrepreneurs selected among the 200 applicants.

3.2 DOPING Program

Moreover, Bilkent CYBERPARK has launched a new customized program named DOPING supported by Ankara Development Agency in end of 2016 for start-ups. The priorities of the program are to identify the commercialization and growth obstacles faced by entrepreneurs and get rid of them with the one-to-one mentoring. Furthermore, it provides tools to benchmark services offered and a method how to help the start-ups to survive and develop their business. The project consists of 4 stages to be completed in 3 months: 1) selecting 15 start-ups facing

problems with commercialization 2) analyzing their needs with the help of questionnaires and one-to-one meetings (diagnosis) 3) making suggestions and mentoring for commercialization and 4) coaching start-ups for investment pitching. DOPING takes (a goal based) objective oriented approach to working with companies. Each company set their own goals, and therefore the definition of 'success' varies for each company. With this project, CYBERPARK can assess start-ups' commercialization performance, diagnose any common barriers for marketing and create a model to overcome these obstacles. Through its spill-over effect, DOPING model is considered to help foster Ankara Entrepreneurship Ecosystem and regional economy. DOPING model enables startups to benefit from mentors to convert their technological findings into a commercial product.

The details and results of DOPING will be presented at the 34th IASP World Conference on Science Parks and Areas of Innovation (IASP) on September, 2017 in Turkey. IASP is the worldwide network of science parks and areas of innovation. It connects the professionals managing science, technology and research parks (STPs) and other areas of innovation and provides services that drive growth and effectiveness for all members [5].

Figure 5 DOPING Demo Day

3.3 UTTP Program

Bilkent CYBERPARK has managed "The Practical Technology Commercialization Program (UTTP)" develops knowledge and skills regarding how to assess the market value of a technology, bring it to market, and generate wealth in the process. This dynamic program offers intensive instruction that aims to demystify the technology commercialization process in order to improve skills in technology assessment, intellectual property management, business pitch development and understanding of alternative funding models for startup creation and licensing opportunities.

Figure 6 UTTP Graduation Ceremony

In 2017, The UTTP program also focused on developing skills for TTO's, accelerators, mentors, investors, and others in developing the ecosystem around their TTO to enhance the local capacity around their institution to commercialize technologies.

4. Conclusion

Developments in the last two centuries have shown that innovation is one of the main sources of wealth creation both at the national and global levels. As a result, Turkey is investing more into science and technology policies, as an important driver for the creation of a strong economy and improved quality of life.

Besides providing high quality office space (with proper infrastructure) for entrepreneurs, STPs should also be able to provide value added services which can help to minimize their tenants' changing problems due to globalization and dynamic economic environment. In general, it can be said that the most important value added services provided by STPs are networking, training, legal advisory, business model verification, management consultancy, acceleration, cluster programs. Moreover, an STP needs to be effectively engaged with other innovation actors to improve their clients.

STPs can contribute to the "right mix" of research excellence, entrepreneurial activity and public support strategies that is prerequisite for region to be identified as a "region of knowledge", "science region", or "creative region". At the same time, STPs can develop an environment where new ideas, valuable information, pool of skilled labor and technological innovation can appear and be available for and easy accessible by the constituent firms. Hence, STPs offer benefits and support for both, local high-tech base and constituent firms [6].

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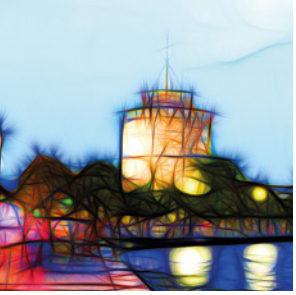

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RETHINKING SERBIAN STRATEGY FOR ENTREPRENEURIAL SUPPORT IN THE LIGHT OF THE ENTREPRENEURIAL ECOSYSTEM

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Serbia has started transition in 2000. Although it experienced fast growth prior to the global economic crisis, critical number of small and medium enterprise (SMEs) was not created to achieve a sustainable development of entrepreneurial sector. During the crisis period SMEs faced with development limits, especially shops and micro companies. In the period 2009-2014 Serbian economy had zero rate of growth, the business climate was generally somewhat deteriorated and support of Government, local level of governance and financial institutions to small and medium enterprises and entrepreneurship (SMEE) weakened. There are positive signs of economic recovery of Serbia during 2015 and 2016. The market reforms got momentum in some important areas. The Government successfully put huge budget deficit and public debt under control. The inflation rate became for the first time low, similar to the European level. The Strategy for support SME, entrepreneurship and competitiveness in the period 2015 -2020 was enacted at the end of 2014. Its importance became critical considering weaknesses of entrepreneurial sector, bottlenecks and limits of existing governmental measures for entrepreneurial support. The point is to highlight those from the point of view of development the entrepreneurial ecosystem, as new conceptual framework designed to foster economic development via entrepreneurship, innovation and small business growth.

Keywords
Entrepreneurial Ecosystem, Measures, SMEE, Support

1. Introduction

Serbia has started market reform in 2000, as the last among countries of Central and Eastern Europe. Prior to the crisis it experienced fast development of entrepreneurial sector, due to overall improvement of business climate and supportive Government measures. In spite of the wish the critical number of new companies and shops did not achieved and the development of the sector did not became sustainable. The global economic crisis severely affected the economy, especially micro companies and shops. The business climate deteriorated, supportive measures weakened and also financial support. It seems that 2011 was the worst one, when more companies and shops were closed than started their activities. After the period

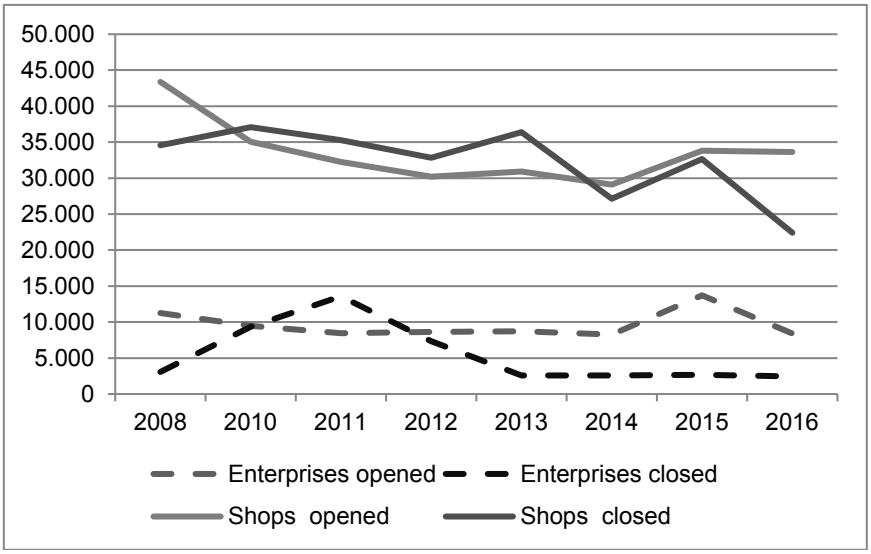
2009-2014 with zero rate of growth the national economy secured recovery. Additionally, the market reform got momentum in important arrears.
Now, the overall development strategy and supportive measures to SMEE ought to be oriented more to the level of companies in order to improve their efficiency and competitiveness. The main development hindrances have to be overcome, like weak financial support, heavy fiscal duties, complicated fiscal and inspection procedures. In the light of the entrepreneurial ecosystem, as new framework for entrepreneurial support, the Strategy for support SME, entrepreneurship and competitiveness in the period 2015 -2020 has to be reexamined.
The aim of the paper is firstly, to envisage the current stage of development of Serbia SMEE including strengths and limits and secondly, to evaluate the network of institutions responsible, development documents and current measures for SME support in the light of the entrepreneurial ecosystem as new conceptual framework.

2. The economic recovery is secured

After six years with zero rate of growth GDP real increase was positive in 2015 and 2016 (0,8% and 2,8%, respectively) with encouraging expectation for the next period (projection of 3% and 3,5% growth for 2017 and 2018). The economic recovery was registered due to increase in domestic demand and somewhat in foreign one. The economic activity is higher 2,4% in comparison to pre-crisis period. Industrial production increased (4,7%), also construction (9,3% in the first three quarter of 2016), retail trade volume (7,5%) and tourism (13%). Volume of export increased in 2016 for 11,5% while import volume 6,1%, with increasing cover of import by export (77%). Foreign trade deficit was 4% of GDP and completely was covered by foreign direct investments (FDI amounted 1,8 and 1,6, billion € in 2015 and 2016, respectively) [1].
After years the inflation rate became comparable to the EU level. In 2016 it was 1,6% (1,5% and 1,7%r in 2014 and 2015). It was due to domestic factors – fiscal consolidation measures introduced and external factors – low oil prices and low agricultural prices. Moreover, it was lower than the target fixed by the Central Bank (National Bank of Serbia) 4±2%. So, in meantime NBS decided to put down the target limit to 3±1,5%. NBS also put down referent interest rate to 4% p.y., which is the continuation from the late 2013 during which the rate was decreased by 7,75 pp. The low inflation rate was important for foreign exchange stabilization as RSD was corrected by 3,5% only during the last four years. High level of foreign exchange reserves of NBS (10,2 billion €), the stand - by arrangement with IMF and improved the credit rating position (Moodys' improved Serbian position from B1 to Ba3) were important factors, as well [2].
It seems that Serbia put its main development bottlenecks under control. The Budget deficit in 2016 was 1,7% of GDP (6,6% and 3,7% in 2014 and 2015, respectively), much lower than projected. The fiscal consolidation was due to introduction of painful measures, like the cut in wages in public sector and pensions by 10% and improved collection of fiscal duties. In 2016 the total public debt as the share in GDP was 72,9% (75% in 2015), although the starting cut of the public debt was expected from 2017 on, as the program related to stand by arrangement with IMF was stated. The total external debt, measured as its share in GDP, at the same time was 76%, which is encouraging improvement in comparison to its maximum (81% at the end of 2013) [1].

3. The better expectations by entrepreneurs

The market reforms got momentum in addition to improved economic climate. According to the Doing Business Report for 2017 prepared by World Bank, Serbia belongs to top ten leaders in market reforms, as it was ranked as the 47th while it was the 54th the year earlier. The main step forward was related to shorten and improved procedure for the construction permit (according to this Serbia improved its position from the 152nd to the 36th). Also important steps were improvement within the Land registry and the Agency for Business registers (Serbia moved from the 72nd to the 56th position and for the later from the 62nd to the 42nd position, respectively). At the same time complicated legal and administrative procedures were assessed as the main development hindrances (namely, a contractual execution and electricity permit) [3].

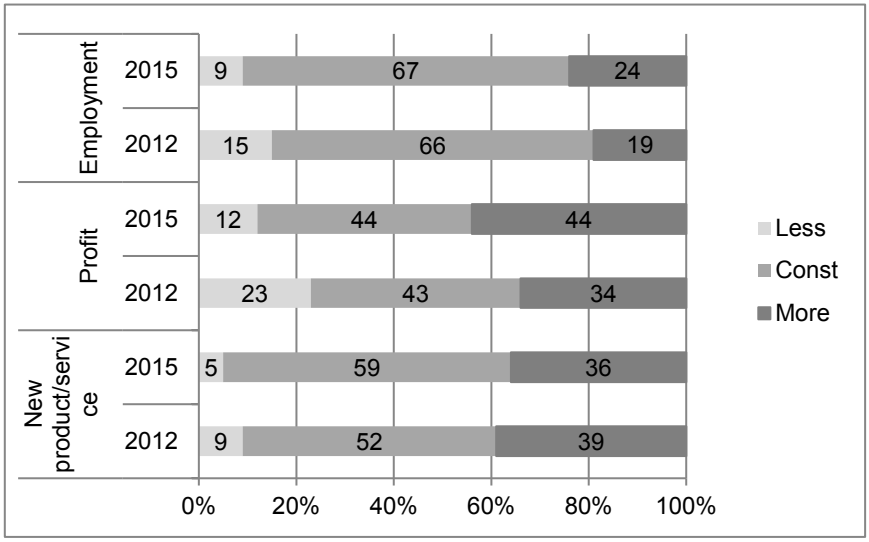


Source: [4]

Figure 1 Serbia – Opened and closed companies and shops

It seems that Serbian entrepreneurs felt more comfortable then before and as the result more and more companies and shops were started their business each year, while at the same time the trend of closing business was somewhat slower. During the crisis the worst was situation in 2011, when for the first time in the transition period more companies and shops were closed than newly established (a negative result of business demography) [4].

The investigation was made with one thousand entrepreneurs in companies and shops in order to prove that business environment is improved and consequently the expectations of entrepreneurs are better than before. The questionnaire was related to business environment, business results and business plans. It compares 2012 and 2015. As one can consider the businessmen are more optimist then before as result of speeding reforms in recent period. According to the investigation more entrepreneurs are expecting higher profit in the future (44% and 34% in 2015 and 2012, respectively) and higher employment also (24% and 19%, respectively) [5].



Source: [5]

Figure 2 Serbia – Businessman's expectation

3. The Reexamination of government measures and strategic documents

The entrepreneurial ecosystem is new conceptual framework designed to foster economic development via entrepreneurship, innovation and small business growth. Among others it emphasized legal, bureaucratic and regulatory framework, which is by Serbian entrepreneurs assessed among the main limits for entrepreneurial development. The combination of different financial models for financing is vital for entrepreneurial ecosystem, while the finance is seen (by entrepreneurs, also) as a development hindrance. It also stresses that supportive measures have to be in line with local conditions, although they are predominantly of general character [6].

Another important issue which was pointed by some experts is reexamination of the industrial policy. They criticized the industrial policy if it should pick winners only, as it can be accused for distorting competition. At the same time a new manner of an industrial policy is advised, by which clean investments are encouraging, investments into tradable and challenging fast growing economies, as well. This approach advocates the need for transformation of the national industry, competition policy strength and government activism. As result, a reexamined industrial policy can produce more green economy, overcome the lack of financial support, emphasize the importance of decentralization and give better outcome if it is implemented in competitive sector [7].

The production and services, manufacturing especially, are transformed dramatically with science – technology driven changes, as follows: rising productivity, autsourcing services, Global Value Chains, relocation of labor intensive operations, changes in skill composition and other high potential invents. The interesting analysis with policy recommendation was performed, with an aim to raise competitiveness of Serbian companies, including SMEs, through industrial policy. Serbian manufacturing has been stagnant during the transition period,

mainly due to low investments and low value added (25%). The steps which can change this related to the increase in investments in manufacturing as foreign direct investments (FDI) were oriented toward non – tradable sector and to invest in order to close competitiveness gap (Serbian productivity in manufacturing is around 40% of those in Hungary, Czech Republic, Slovakia and Poland, while at the same time wages are lower in comparison to those countries). There are different possibilities to improve competiveness by government active measures and at the same time on the level of companies, with differentiation between large companies and SMEs. The Structural analysis was performed for Serbian industry in the period 2009-2015, based on Lyvesey's concept of relative industry maturity (2012). The outcomes of the study are interesting and informative, especially for policy makers. Serbian industries according to their maturity were separated into four categories, as follows: Emerging (electric equipment, motor vehicles, rubber and plastic, wood); Still Growing (food, leather and textile); Shrinking (IT, metal production, furniture, Machinery) and Stagnant (metal, beverage, chemical, petrol product and tobacco). So, recommendations for policy makers can be summarized as follows: proactive FDI policy, including investments promotion and improving overall business conditions, and proactive SME policy with industrial policy elements targeted to support SME with potential. Considering general institutional instability and the lack of resources it seems that this targeted SME policy is more necessary [8]. It is worth noting that there is intention to support education, training and IT start - ups with certain funds (10 million €), in line with the Operational plan for support IT sector in 2017.

Research, Development and Innovation (RDI) is by middle - income and emerging economies seen as important effort to move up in global value chains, to escape “middle - income trap” and move toward knowledge based economy. RDI was recognized by all countries within the Region of South East Europe (SEE) as essentially important factor in order to improve world - wide competitiveness of their economies and during the transitory period considerable efforts were made. However, the look into the stage of RDI development estimated that SEE is below the EU average and far below their development needs. The general assessment tells us that the average score of the Region is 1,6 out of 5. It says that the countries in the Region started to shape RDI policies. It is important to note that Serbian score is higher than average (2), which indicates that it adopted, but not implemented yet the whole framework. SEE countries already improved use of limited R&D sources, improved R&D policy framework and recognize R&D international cooperation as a priority. However, the challenges are still opened. Firstly, RDI expenditures are very low, less than 0,5% of GDP in comparison of 2% of GDP in EU. Additionally, a small portion of R&D comes from the private sector (12% in comparison to the EU average of 54%). There was little coordination between institutions responsible for development of specific industries and different regions, between public and private sector in R&D, as well. The Institutional infrastructure for R&D is not finished yet and strategic documents were not completed, as well. Essentially important is to strengthen research base, as one of the main finding is that the research base is pure, among others, because of the brain drain process on the way from less developed countries generally, where SEE countries belong. Considering low level of private R&D a recommendation of the study is, among others, to give incentives to private R&D and build infrastructure relevant for the sector. Within the framework of process of joining EU, Serbia has already started preparation of the Strategy for Research and Innovation for Smart Specialization (so called RIS3), where the point is to mark industries in which investments would results in knowledge based growth [9].

The Spatial dimension of development is very important. Serbia for decades is suffering from great and increasing regional discrepancies. Namely, the differences between regions are even more than 1:20, measuring by GDP p.c. During the transitory period those discrepancies were widen, due to the lack of the measures of regional policy and prevailing market forces in new investments, especially in foreign direct investments (FDI). So, one can recognize that spatial development tend to be concentrated along with European transport corridor X, from North to South (Subotica – Belgrade – Nis). Obviously, the analysis of the interrelation between industrial policy and regional policy has to emphasize the need to promote competitiveness of all regions. Serbia puts sector policies high of agenda of its industrial policies. The Industrial Policy of Serbia in the period 2011 – 2020 was adopted as the strategic document, with two pillars: a) sector specific approach: strengthening of some specific sectors, like food production, automotive and metal industry; and b) increased attention to regional industrial development, with establishment of regional industrial centers and infrastructures. The heavy concentration in R&D activities was a problem highlighted, which limits diffusion of knowledge. So, R&D mapping was suggested as starting point. The discrepancies between sector strategies and other national policies, was recognized as an important challenge. It is important issue for investment incentives, when it comes to investments location prioritization, because of conflicts between different stakeholders. In order to overcome the issue a closer inter-ministerial coordination and involvement of all relevant regional stake-holder seems to be useful. The numerous of the national and regional strategic documents and plans were created during the time, with low level of coordination between each other, even with mutual conflicts present. It asks for better coordination and more active approach by regional stake-holders. During the preparation of investment programs and plans regional actors are rarely or even not consulted at all, which asks for compulsory consultancy and more transparent processes. Even, it seems that regional stake-holders often do not understand how they can contribute to overall targets and aims in industrial sector strategies. Instead, the plans and projections would be prepared and discussed on both the national and regional levels as well [10].

4. Conclusion

Serbia has secured its economic recovery from 2015 and one can expect respectable rate of growth during the next several years. Important for all economic subjects, but for small and medium scale enterprises essentially important, is to secure the continuation of market reforms, which got momentum in the recent period and together with higher internal and somewhat external demand produced more optimism among entrepreneurs and higher expectation for future, regarding productivity increase, employment and profitability, as well.

The entrepreneurial ecosystem, as new conceptual framework was recently designed to foster economic development via entrepreneurship, innovation and small business growth. Considering low level of competitiveness of Serbian companies abroad it is important to continue and strengthen government supportive measures for entrepreneurs. In the future those measures have to be more oriented toward micro level, the level of companies and specific to local and regional level. Government FDI policy has to be proactive in order to reorient FDI more to manufacturing and tradable sectors and proactive entrepreneurial policy with industrial policy elements. Serbia seems has created RDI policy framework, but the point is firstly, to implement it fully and secondly, to overcome challenges, like low level of RDI

expenditures in GDP and by putting incentives for private RDI expenditure, to strengthen research base and better coordinate activities of different institutions responsible, especially on the local and regional level. Regarding spatial development and widened regional discrepancies it is relevant to coordinate industrial policy and regional policy in order to push up competitiveness of all regions, which asks for better inter – ministerial coordination and more active approach of local and regional stakeholders.

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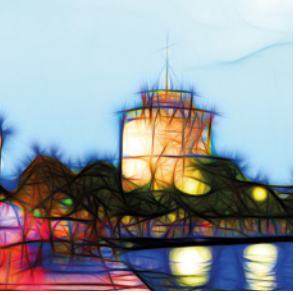

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TALENT MANAGEMENT IN HEALTHCARE ORGANIZATIONS

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In recent years Talent Management ™ is becoming very popular and attracted the attention of academics as well as HR professionals worldwide. TM is considered more than Human Resource Management, leadership development, career development or succession planning. It is a collective approach to recruitment, hiring, retention and development of talent within the organization itself for its future benefit and includes strategic characteristics, while contributing to the culture of the organization. Talent management however is not examined in depth in the Health Sector and especially in Greece. Hospitals are often preoccupied with the technical and administrative processes leaving aside the planning, acquisition, induction and development of employees in all sections (medical, nursing, administrative). The purpose of this paper is to investigate and analyze both theoretically and empirically the status of Talent Management implementation in Greek public and private health facilities.

Keywords
Healthcare, Human Resources Management, Talent, Talent Management

1. Introduction

The recurring and continuous developments in the health sector, combined with the economic crisis of recent years, have necessitated the proper and integrated management of the human factor. Within this framework, health organizations are invited to integrate high-performance workers and executives into their workforce. Applying management strategies to these employee-talent can contribute to the survival of the organization in today's highly competitive environment, but also in achieving its goals. Attracting, selecting, developing and retaining employees are no longer a simple process for organizations. The demanding task of talent management is usually completed through a Human Resource Management department. In order for talent management strategies to be implemented effectively, organizations should understand that so-called "talents" are not an expense for them, but rather their main asset. The following part of the paper briefly refers to the concept and implementation of Talent Management. Methodological analysis and results are described in the two subsequent parts, and then the final parts of the paper present the conclusions of the present study.

2. Talent Management – A Literature Review

It is quite difficult to define the precise meaning of the terms "talent" and "talent management" because of the confusion about the definitions and the many assumptions made by writers studying the subject. However, despite the extensive discussion of the issue over the last fifteen years, the structure of talent management is affected by conceptual confusion due to the ambiguity surrounding its definition, scope and general objectives [1],[2]). Academics and researchers differ to a great extent in understanding what talent and talent management really are. In addition, there are many differences in the use of terms in different industries, as each organization may adopt its own "interpretation" and not one generally accepted.

The historical tale of "talent" dates back to the ancient world (Latin: talentum, Greek: talanton) where it was used to declare a unit of weight or money [3],[4]).In modern dictionaries, talent is defined as "a natural ability of one to be good at something, especially without being taught" [5]).In particular, the term "talent management" appeared in the spotlight in 1997 when a team of McKinsey & Company consultants formulated the expression "the war for talent", arguing directly that a fundamental belief in the importance of talent was necessary to achieve the organizational superiority of an organization [6]. Since then, Talent Management has become an increasingly popular topic of discussion, and in recent years there has been a remarkable increase in the number of articles and books on this subject, stressing that this is a high priority issue for organizations in Around the world [7], [8]). According to international literature, proper talent management is considered to be a crucial and determining factor for the success of the organization [9]), and is characterized as an imperative for its survival and sustainability [10].

As a talent, one can define the sum of a person's abilities, such as inherent gifts, skills and attitudes, knowledge, experience, intelligence and critical ability. It also includes the ability of a person to learn and develop within the environment in which he works [6],[11],[12]) argues that talent management "involves managing supply, demand and talent flows through the human resources management mechanism". Creelman [13], on the other hand, suggests that talent management should be considered as a mentality, according to which talent is at the forefront of organizational success.Basically, talent management is simply a matter of anticipating the need for human capital and defining a plan to deal with it [14].In addition, a large number of articles in the international literature describe talent management as a key element for effective executive success planning [15] and as an effort to ensure that each employee works to the fullest extent possible [16]. However, several authors fail to define these two terms precisely [17],[18], or conclude that there is no clear or concise description [1], [19].Nevertheless, Ashton and Morton ,2005 [20]) accepted the strategic importance of talent management.As we can conclude, paradoxically, talent management scholars are rarely accurate about the meaning of the term, which is probably due to the existing tacit theories about what talent management recommends [21]. It seems, therefore, that talent can mean anything a leader or writer wants to mean, since everyone has his own idea of what the talent management structure includes or not [22].Gallardo, Dries and González-Cruz [23]), in an article published in the Human Resource Management Review, reported on two different approaches to talent. The "objective" approach, which is dated earlier, refers to

the personal attributes of talent. In contrast, the “subjective” approach refers to someone who has one or more talents.

The relatively recent study and research of talent management has led to a shift from the more traditional sources of competitive advantage associated with HRM and the Strategic HRM [24], [25],[26],[27],[28]) to the specially tailored talent management in today's dynamic and competitive environment[29].As mentioned earlier, despite the fact that there is no specific and clear definition of talent management, Lewis and Heckman [1]) have been able to identify three mainstream thinking around this concept.The first features talent management as a collection of formal human resources practices such as recruitment, selection, leadership development, career planning, and succession development.The second part of the literature focuses mainly on the concept of "talentpools" or "talent tanks", i.e. a set of processes to ensure an adequate flow of employees to jobs throughout the organization.The third perspective on talent management focuses on talent in general and includes within it two views that have arisen about it. First approach supporters classify employees according to their level of performance ("A", "B", and "C" top-to-bottom players respectively), encouraging the termination of "C" players and the exclusive recruitment of "A" players [30]), while the second approach treats talent as an undifferentiated good, resulting both from humanistic and demographic perspectives [6].

Collings & Mellahi [29], in addition to the above three trends in talent management, have identified and added a fourth-stream emerging which emphasizes the recognition of key positions that have the potential to influence differently the competitive advantage of the organization.They therefore relied on this approach and attributed the definition of strategic talent management to “the activities and processes of systematic recognition of key positions that contribute to the sustainable competitive advantage of the organization, the development of a talent pool of high potential and high performance for these roles, as well as the development of a diversified human resources architecture to facilitate the filling of these positions with responsible people while ensuring their continued engagement with the organization”. However, the conceptual limits of the strategic talent management have not been fully elucidated, with the result that there is considerable room for research in this field and, more specifically, the diversification of the strategic talent management from strategic HRM.

In today's knowledge age, HRM practitioners are confronted with the major challenge of managing and maintaining talented people within their organization. Most organizations, for the most part, own the same technology and use similar, if not identical, marketing, production and financing practices. The factor, therefore, that will attribute the characteristics of uniqueness and diversity to the organization, but will also provide him with a competitive advantage, is his people. The above reasons are the ones that make talent management one of the most important and leading functions of the HRM. According to Clark, Stewart and Clark [31], in order to be successful, an organization must have a fully integrated system whose parts are interrelated. In the modern, so-called economic downturn, talent management is a critical area for the success of an organization [32]. According to Parul Saxena [33], some of the reasons that led the HRM department to the current need for talent management are:

• Organizations face a lack of talent. In an ever changing and evolving work environment characterized by international mobility, organizations and executives face a crisis in talent.

• Changing the demographic data of the workforce. The demographic changes faced by many Western countries lead to shortages of talented workers.

Organizations that have implemented talent management processes seem to have solved not only the problem of maintaining their employees but also have the ability to develop and maintain a talent pool. A talent management system should be implemented at all levels of the organization, not just in the HRM section, in order for an organization to attract and retain its employees.

From the employer's perspective, talent management can deliver significant business benefits such as Saxena P[33]: the diversity of the workforce, building a high-performance workspace, the emergence of a learning and development culture, ensuring performance values, commitment of employees, keep talented people, and improving the image of the organization and its position on the labor market.

From the perspective of the employee, the benefits seen when the organization invests in talented people are the following (Saxena P [33]: commitment to their work, increase efficiency, work satisfaction, developing good relationships with management, high morale, implementation of personal and professional development.

Therefore, talent management is an important part of proper implementation of HRM and can help organizations understand that the skills, experience and abilities of people are the main factors that lead to the achievement of the strategic objectives and their business plans.

3. Talent Management in Healthcare Organizations

Healthcare organizations, nowadays, are faced with tough decisions about how to spend their time and money. Pressing needs, such as human capital management, technology upgrades and plant expansion, are constantly increasing, while the resources available to meet these needs are reduced. Talent management faces a crisis in many hospitals around the world. Health organizations without the proper procedures for identifying and developing talents have difficulty operating and competing at a high level in the new health economy. At a time when so-called "carrots" such as rises are out of negotiation, healthcare organizations are prevented from cultivating employee responsibility, loyalty and tolerance, leading to problems in maintaining and recruiting top talent in a market where the changes are successive and the skilled talents rarely. As is true of any service provider, talents in healthcare organizations are also considered to be the largest and most important assets they have. The health sector as a whole can respond to the existing challenges of financial and inpatient care with the systematic development of leadership talents at all levels, from front line staff to leading executives. To achieve this, it is necessary to invest in programs and procedures that will make employees capable of contributing to the success of the organization. The health care industry can take a lesson and apply practices from other industrial sectors that have shown that leadership development and talent management have a positive impact, even in the midst of an economic crisis.

Talent management is an area that has room for further research, let alone in the health sector where literature is still incomplete. The generalized view that the ability of healthcare organizations to attract and develop leadership talents is a strong indication of their high performance, has led to surveys to study the issue.Indicatively, several surveys have demonstrated the linking of talent management with the development and

cultivation of future leaders [34],[35]), while some have dealt with specific areas in which it could be promoted The development of future leaders [36]. The discouraging, however, study results conducted by The Advisory Board in the United Kingdom predict a drop in health leadership tanks by fifteen percent over the next few years.In addition, a joint research by Mckinsey Company and London School of Economics and Political Science (2008) across 126 hospitals in the UK demonstrates a strong linking of talent management with lower rates of inpatient infections and patient readmission, with more productive workers, satisfied patients and higher profit margins. To the above results is also added a linkage of hospital improvement with a strong leadership from doctors to management. Positive and encouraging conclusions also resulted in a study conducted by the National Leadership and Innovation Agency for Healthcare in Wales. In this study, talent management strategies and succession planning have been developed and implemented which in one year have shown tangible achievements. Another UK case study is the North Wales National Health System (NHS), which demonstrates that developing understanding of the organizational framework, strategic approach and the relevant labor market is vital to creating a talent management program (CIPD,[37]. Concluding, Health Management Academy's research results made at leading hospital executives support a clear consensus that strong leadership is key to the success of the organization. However, only 41% of executives said they were satisfied with the reservoirs of potential leaders and leadership development programs.
Regarding Greece, unfortunately, there are no surveys on talent management in health organizations, only a few diplomatic papers at postgraduate level. The difficult economic conditions and strong labor force trends are important challenges for talent management in healthcare organizations. Although strong elements of the research area support the many benefits of maintaining a strong commitment to talent management practices, many healthcare institutions make the problem more difficult by resorting to staff reductions and limiting or eliminating investment in talent management. And as Fottler, Erickson and Rivers [38] have argued, "Most healthcare organizations see IHL as a leak in the bottom line of their organization."

4. Material and methods

In this research paper, the method used is qualitative research. The researchers focus in depth on the answers, perceptions, culture, feelings and motivations of the interviewees. In addition, this method explores, through observation, the working environment and the way in which it can be influenced in general. The case study approach is used in this study in order to effectively describe and analyze the context and content of all basic aspects related to the subject under study. Contemporary case study scholars stress that nowadays scientific research shifted from the universal and the general, to the particular, the local and the timely [39], meaning that case study approach give the authors the opportunity either to establish theories via analytical reasoning or generate questions, make statements and analyse phenomena under a specific research agenda [40]. For this purpose, three extended case studies were conducted in the selected Greek healthcare organizations.
The selected cases are three health organizations in the city of Thessaloniki. In particular, the research involves two public sector hospitals, one of which has a legal entity under private law, and one private. From now on, we will refer to the private

institution of the private sector as an organization A, to the public health institution as organization B and finally to the corresponding institution with a private law legal entity as organization C. In each institution, personal interviews were conducted with: the chief executive, the director of Human Resources, the director of the Medical Service and the director of Nursing. The three organizations were selected based on the notion that 'generalizability of case studies can be increased by the strategic selection of cases' [41] with the aim to gain as wide a perspective as possible [42], [43], [44]).
The data gathering was carried out through extensive and in-depth interviews in all three organizations, using a semi-structured questionnaire with open-ended questions. The main purpose was to collect data and produce basic information, enabling qualitative observations concerning the implementation of talent management in these hospitals. Each site was written up as an integrated case study, with the focus on drawing out the commonalties of meaning and understanding each site. The questionnaire used was divided into three main parts. In the first part the questions relate to the profile and role of the human resources department and its contribution to the achievement of the goals of health organizations. The second part consists of questions through which the existence of policies, procedures and tools for the preservation of talents are investigated. And finally, in the third part questions are grouped on the investigation of the implementation of talent management and focus on the development of ways.

5. Results

Profile of respondents
The sample of research in number is twelve executives from three different health organizations. It is worth mentioning that the level of the majority of interviewees is university education (with few exceptions of technological education), most of them holding postgraduate degrees. In particular, in organization A, the 4 respondents are graduates ofHigher Education Institutions (HEIs) and hold postgraduate diplomas. Regarding organization B, the chief executive and the director of the Medical Service are graduates of the HEIs, with the former holding a postgraduate degree, while the director of the human resources department and the head of the nursing service are graduates of Technological Institutions. And finally, in the organization C, all respondents are graduates of HEIs and holders of postgraduate degrees except for the head of the nursing service. There was willingness for interviewees to take part in the survey, but most of them faced some difficulties because of their ignorance of the topic.
HRM strategy and policies
The chief executive of organization C states that "in order for an organization to progress it is necessary that human resources issues be a key factor in the senior administration agenda." Additionally, the director of the human resources department of organization A stresses that employee problems are also problems of the clinic and that there are employee-focused policies one of which is to support their health problems where workers are only burdened with the costs and the other benefits are free of charge. However, in contrast to nursing and medical management, the chief executive of organization B simply states that "we are not dealing with human resources issues" while the director of the human resources department states that economic issues comes first into the hierarchy of administration.

The answers given by the organization's B respondents on the human resources targets were that "there is no specific targeting". In contrast, the director of the human resources department of organization C stated that "the hospital's goals for employees are, besides developing the necessary knowledge, the existence of loyalty and commitment to the values of the organization, sensitivity and enthusiasm for the sufferer, distinction, the ability to communicate, the development of systematic and creative thinking as well as the function within groups ". In addition, the director of the medical service of organization A emphasized personal guidance, whereby the bosses with their employees set up new targets for their path and development within the clinic.

To the question of whether something has changed in human resources management over the last years of the crisis the answers vary. The director of the human resources department of organization B highlighted the extent of the problems they faced as a result of the understaffing that arose because of the lack of recruits during the crisis even though they were an urgent need. In organization C, the head of the nursing service said that since the financial crisis has erupted, the workload has increased, while workers' wages have fallen. The director of the medical service of the same organization adds that "our main concern is the fact of leaving because of financial difficulty, with parallel withdrawals of staff to the private sector or abroad". As for organization A, the head of the nursing service commented that "the right professionals should not be affected in their work due to the crisis", leaving the question of changes in the human capital administration unanswered, while the chief executiveof the organization underlined that even in a period of crisis the administration ensures that all its obligations to employees such as the monthly payment of wages are "settled".

Attracting, selecting, developing and maintaining talent

Despite the widespread knowledge and implementation of talent management in several health organizations abroad, in Greece, as it emerges from the survey, the term has become known in recent years.Specifically, in organization B none of the 4 respondents know the term, while 4 participants from organization A and 2 from organization C stress that they have knowledge about talent management, which they acquired initially from their postgraduate studies and afterwards from the partial implementation of talent management processes that have evolved over the last two to three years through their human resources department. Therefore, in our research, the term "talent management" is not yet known to all healthcare professionals and is not yet applied with specific techniques and methods in Greece's health organizations.

In Greece, recruitment and selection in public hospitals is carried out by the Supreme Council of Personnel Selection (ASEP), which "makes us unable to choose the personnel we need", stated the director of the human resources department of organization B. However, the situation is different in the private sector, where the management is free to recruit employees according to its own criteria, which usually have a profit-making character for the benefit of the organization. In particular, the chief executive of organization A says that the recruitment of employees is done either from internal sources such as their own CV pools or from external ones such as newspapers, advertisements or job placement websites, while the director of the medical service of the same organization added that after gathering the CVs that meet the criteria of the position, interviews with the candidates are held out in a structured form to check if the candidate has all the qualifications required by the post. Finally, he added that there is

some behaviorbased questions in the interviews whose purpose is “to make us able to control past and future work behaviors.”
The process of measuring employee performance and their contribution to the organization's success is carried out through the evaluation as stated by the 12 survey participants.
The formal evaluation is carried out once a year in all three organizations. In organizations A and C, based on the respondents, in addition to the assessment of work behavior and performance, there is also a parallel placement of employees' personal goals for the next period. Through the evaluation, the strengths of the employee are identified and there is discussion about the points that can be further improved and the prospects for the employee's development within the organization. On the other hand, in organization B, the evaluation is not treated in the same way, according to the head of the nursing service which characterizes it as a "rustic process that suffers". In addition, the director of the human resources department answered the question of evaluation and management performance with the word “inadequate”. It is becoming clear that in public hospitals it is even more difficult for talents to emerge and differentiate, as even the assessment that is being applied cannot help in discovering and exploiting their skills.
As for the education, all three organizations have training offices through which sectoral, cross-sectoral and specialized training programs take place. The director of the medical service of organization A also mentions cooperation with external trainers to promote and develop new skills for workers who consider talents, while the chief executive of organization C emphasizes that education is part of the hospital culture, aspiring to “become alifelong learning organization”. However, all respondents agreed that there is room for improvement in the education and development of talents in their organizations.
About practices used to preserve talent, there appears to be a discrepancy between the three organizations. More specifically, the director of the human resources department of Organization C states that their practices to maintain their talents are their utilization in positions of responsibility, their development, further training and rotation. The same director of organization A indicates that maintaining talents within the organization is limited to enriching their role with new responsibilities and developing them whenever possible, while the director of the human resources department of organization B notes that it has not been implemented talent maintenance procedures in their hospitals so far. However, all 12 participants report that an important incentive to maintain talent in an organization would be to raise wages or provide bonuses, but they recognize that these ways are unlikely to be implemented in Greece under the eve of the economic crisis.

6. Conclusions

In this diplomatic research, we chose to study the issue of talent management in Greek health organizations. Three organizations participated in the survey. The two belong to the public sector, one to a legal entity under private law, and the other to the private sector. From the analysis and interpretation of the qualitative data came some findings which led us to some conclusions.

- Talent management is a term that was first mentioned after studies by McKinsey & Company in the 1990s (Michaels, Hanfield-Jones, & Axelrod, 2001 [6]). Even though in European health organizations talent management is successful, in Greece the

term is not known to many health professionals. As shown in our survey, talent management is only known to participants holding a postgraduate degree, unlike the others who were ignorant of the subject.

- According to this research, human resources issues are first on the agenda of senior management of private health organizations, but they do not have the same importance for the public health organizations.
- The economic crisis that Greece has been experiencing over the last 10 years has also deeply affected the health sector. The survey reveals that public hospitals were understaffed due to the delay in recruitment to the public, leading to a lack of foundation in the application of human resources practices. In a similar but slightly better situation is the private health sector, which, despite being hit by the crisis, did not stop investing in the human factor through the effort to maintain and develop human resources practices.
- In today's trend of economic downturn, talent management is a critical area for the success of an organization (CONF 2003 [32]). Through our research, we can see the ignorance of talent management in the public sector, as opposed to the private one where some talent management processes are implemented through the human resources departments.
- Attracting and selecting an employee are two very important points of talent management [45]. According to the results of the survey, the ability to determine the skills of a prospective employee is a very difficult part for the public sector as recruitment is done through ASEP and not directly through the human resources departments of hospitals which makes it difficult to recruit and select employees - talents and by extension the very application of talent management. On the contrary, in the private sector, the recruitment and selection of employees is done by the human resources departments with the main aim of selecting the most suitable candidates who meet the requirements and have the qualifications required by the position.
- The development of the talents of an organization is now considered necessary. Through the development of human resources, the objectives of the organization are achieved faster and more easily. In the public sector, talents are not being sufficiently exploited as the only process that is taking place is putting them in the position they may perform best, which is determined on the day of recruitment. In the private sector, on the other hand, employees can develop and evolve through performance appraisal.
- It is now perceived that the development of talent skills brings greater benefit to the organization itself [46]. Through the research, we conclude that despite the economic hardship experienced by the health care sector, both in the private and public sectors, emphasis is placed on the development of employees' talents through education.
- Equally important, however, with growth is to maintain a talent. The results of the research show that the ways in which the private sector is used to preserve talent involves using them in positions of responsibility, position change, further education and their development. In contrast, no talent preservation procedure is in place in the public sector.
- As is shown by our research and interviews with executives, the private sector is particularly concerned about employee engagement and actions are being taken to measure this through employee retirement and withdrawal, while in the public sector

there is no process of strengthening or measuring employee engagement, and this may be due to inadequate human resources practices.

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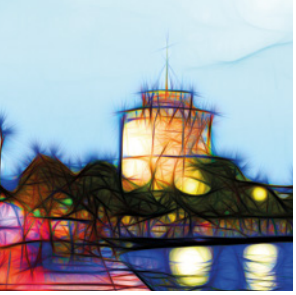

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PUTTING ENTREPRENEURSHIP INTO PRACTICE: A 4-YEAR CASE STUDY FROM A PORTUGUESE ENGINEERING SCHOOL (FCT-UNL)

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FCT-UNL is the School of Engineering affiliated to NOVA University of Lisbon. Bonds with the business world are a priority for years, having generated a research organisation in 1986 (UNINOVA) and a science park in 1995 (Madan Parque). This proactive approach to the market was reinforced recently (since 2012/13 academic year) with the implementation of a revised curricular profile for all master degrees (Engineering and Applied Sciences). It was perceived the need to improve the competences of undergraduate students, with a focus on the paradigm of learning by doing in close connection to the business world. The entire alumni population is enrolled within the activities pertaining to the FCT NOVA Entrepreneur Program (FCT-Entrepreneur Program), which extends to 5 weeks in-between the two terms, with various degrees of complexity. The goal is to work closely with students and to get the most of their creativity, by means of inspiring the generation of business ideas which can be developed further at Madan Parque under the framework of its pre-incubation track. Such ambitious 2-stage program is being assessed and improved continuously, taking advantage of the gracious support granted by local actors (city council, companies) and many other partners connected to FCT-UNL extended network.

Keywords
Best Practices, Elevator Pitch, Higher Education, Qualified Entrepreneurship

1. The Program Structure

The team responsible for the implementation of FCT-Entrepreneur Program is composed by several professors affiliated either to the Industrial and Mechanical Engineering Department (DEMI) or to the Applied Sciences Department (DCSA) at FCT-UNL, more precisely the Economy, Management and Industrial Sociology Section. This team is completed with the support of external members: PhD students in some cases, but also experienced businessmen coming from corporate companies.

The FCT-Entrepreneur Program comprises a total of 12 ECTS that is 3 ECTS per year of the first 4 years of the revised curricular profile of all 3+2 MSc Engineering Courses. The overall

structure and main contents of each module is described along the next sections. A simple overview is depicted within the figure below:

Figure 1 Structure of FCT NOVA Entrepreneur Program.

1.1 Transversal Competences for Science and Technology (Module 1)

This first module is very much targeted to the development of soft skills amongst students, with an emphasis on these topics: 1) Insights about drafting a CV; 2) Preparation for a job interview; 3) Advanced usage of spreadsheets; 4) How to write reports and search for information within public databases and 5) Basics of ethics and deontology.

1.2 Science, Technology and Society (Module 2)

This module is intended to acquaint students with generic information about the world from a scientific and technological point of view. Students are stimulated to develop a critical thinking about the impact of science and technology in today's modern society. In addition to the former activities, students are also encouraged to attend eight conferences addressing varied topics, that is:

- Risks, safety and responsibility/ethics;
- Science, technology and gender issues;
- Sustainability networks: environment and society;

- War and peace: Einstein, Bohr and Oppenheimer;
- The future is Bio and Nano;
- And the man has created the cyborg;
- Information Society;
- Science, technology and cinema.

1.3 Undergraduate Research Program or Practice Program

Just in between the last terms leading to the Engineering degree (3rd year), students willing to follow the Undergraduate Research Programme are invited to meet research teams at FCT-UNL who are involved with the development of RTD projects. Otherwise, students can be enrolled within the Undergraduate Practice Program. In such a case, students are placed at companies whose core activities match their scientific background in order to turn such experience meaningful for its recipients.

1.4 Entrepreneurship

The revised curricular profile of FCT-UNL comprises a specific module about entrepreneurship addressing 4th year students only. After the generic training of the first 2 years and the short apprenticeship period during the year after, students have then the opportunity to develop business ideas from scratch. The learning path follows by short the design thinking process as it was conveyed by Rolf Faste (Institute of Design at Stanford) in the late 80s, who pioneered such disruptive approach to problem-solving which is centred on the perception of needs. The design thinking process comprises 5 blocks linked in a sequential way, starting by the EMPHATISE mode and finishing with the TEST mode as it is shown in the next figure:

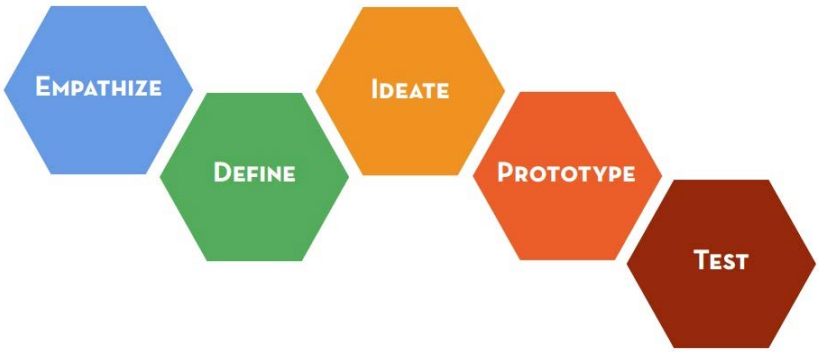

Figure 2 Components of the design thinking process.

2. The Challenges

The reform of the curricular profile was an initiative of the Management Board at FCT-UNL, so there were no major burdens to overcome from an institutional point of view. Nonetheless, the implementation of some activities (module 3 mainly) required the involvement of all

Department Units and the nomination of a responsible team for i) Managing the study visits; ii) Identifying suitable host companies and iii) Supervise the learning outcomes of the interns during their 5-week internship.
This process was far more difficult, once not all Departments were genuinely committed to embrace the changes introduced into the curricular profile and hence there was some resistance to adopt such changes. Once the reform followed a top-down approach, the strong commitment of the Management Board was instrumental, having paved the way to a general acceptance of the new model despite the initial constraints as regard to the new orientations and the respective tasks.
Also from the side of the hosting companies it was not always clear the objectives of the short-period internships, being also difficult to identify the necessary resources for running smoothly the activities proposed. Nonetheless, the enthusiasm and persistence of FCT-UNL staff was determinant to ease the process and to find the right whenever approaching the private sector in such a large scale. There were some misconceptions on the early stages and the assumption of a waste of time and other resources. Years later, the liaison between FCT-UNL and neighbourhood companies is being strengthened having led to the identification of other opportunities for cooperation between the counterparts.
Most of the students were quite motivated to be engaged within the activities of module 4. The man challenges to the facilitators/mentors have surfaced whenever students were taken out of their comfort zone. The first situation to emerge was related to the distribution of students per working groups: instead of allowing groups of classmates, each group have had to be formed by 5 students selected randomly. In such a way, the various groups are multidisciplinary and allow different degrees of reasoning and the intersection of different knowledge, once their background is diversified.

3. Implementation of the Program

3.1 The Learners Perceptions

The initiative was well received by the learners throughout the years, even though there is not any quantitative evidence so far. The feedback from the learners has been done on an informal way, although it is going to change once the management of FCT-UNL does want to have some concrete data about this topic. The assessment of the new curricular profile by its recipients (the students) is a valuable tool for the contents to be improved, therefore feeding the system with a responsible feedback targeted to increase its overall performance.

3.2 Learning Outcomes

This paper attempts to describe the activities embedded within the new curricular profile at FCT-UNL. Due to the limitation of length, some sections will address only one of the four modules. That is the case of the learning outcomes, which will be addressed along the next paragraphs only for module 4 of the FCT-Entrepreneur Program.
The main learning outcome associated to module 4 consists of the development of a business idea coupled with a comprehensive business plan. The business plan does include

several components, such as: A) market study; B) marketing plan; C) management team and core competencies; D) SWOT analysis, considering opportunities and challenges; E) financial plan, including funding sources and F) final statement, with conclusions.

3.3 The Entrepreneurship Module

The reasoning beyond the aforementioned learning outcome flows along the 5-week period, with face-to-face support and mentoring provided both by the professors and other facilitators (external trainers). The framework is the one of the design thinking process, as referred to before. The structure of the Entrepreneurship module comprises 5 sequential parts.
Part 1 is the problem. It starts with an ice-breaking activity, followed by the distribution of students by groups via a random process. As it was said before, each group of 5 elements can have students from 5 different engineering degrees. The goal is to proceed to the identification of the problem / need / opportunity to be worked out. There's a focus on creativity, as well as on the ability to observe / listen /engage.
Part 2 aims at designing a solution to the problem. Students are encouraged to process the information gathered and to refine their ideas, disregarding what is not relevant via a funnelled process. The internal discussions within each group take into consideration the various points-of-view and leads the group into several proto-solutions. The resulting plethora of possible solutions can push forward more questions and variables, leading the groups to convey one final solution (business idea).
Part 3 consists of the market study, as well as a marketing plan. Once the business idea is final, students have to start working on the business plan. The first components to be explored are the ones referring to the market study and to the marketing plan. The market study has to identify the sector to be targeted by the new product/service, the customers and also the competitors, with an emphasis on the competitive advantages and the differentiation factors attached to the new product/service. A SWOT analysis is critical at this point. The marketing plan looks at the desired brand positioning and the means to be used for informing potential customers about the company and what is offering.
Part 4 looks at a detailed financial plan. It is required than an estimation of all costs deemed necessary (operational, financial, etc.) for all phases leading to the release of a new product/service. The intended revenues have to be checked against the investments plan, in order to determine the break-even point and thus infer if the initial projections were feasible or not. It is an iteration process, demanding an intensive mentoring effort by the module's facilitators.
The module ends with part 5 that is the elevator pitch. Each group is requested to deliver several public presentations of the business idea and the respective business plan, with a time-limit of up to 3 minutes. The evaluation follows a 3-stage process.The first filter consists of the selection of the most interesting 70 business ideas, out of the initial 180-200 ideas developed by all groups of students. This process is accomplished by the trainers who were present along the various sessions of module 4.
A second iteration takes place 2 days before the final plenary session and besides the participation of the all-time trainers, there is also an extended jury composed by external advisors not affiliated to the Programme on a daily basis. It is then their first contact with the second group of business ideas. There is a discussion period, with a recommended length of up to 10 minutes during which some questions are posed, the financial plan is verified and

the interest of the idea is assessed. Each member of the jury fills in a form with a classification of 1-5 granted to several items:

- Size of potential market;
- Quality of the team;
- Quality of the business idea being tested;
- Innovative potential of the business idea;
- Ability to quantify the key elements of the business;
- Quality of the overall strategy;
- Adequacy of funding assumptions.

There is also a column for observations (missing issues) and another one for the final mark accorded by each member of the jury to the business ideas being evaluated. The trainers group gathers then all this forms and based on the recommendations of the external advisors group as well as their own perceptions, makes a final selection of the 12 best business ideas. The respective groups are notified at this stage and have then to prepared themselves to the final Plenary Session which is due the day after, in the presence of the whole School of Engineering and its stakeholders; invited companies; banks, venture capitalists and other private investors; other universities; local authorities; national agencies; etc.

This is the special moment for the 12 best business ideas to be presented and a final scrutiny takes place. Everyone group of finalists is a winner, but in each academic year there is a need to nominate the 3 best ones, which benefit from the support of Madan Parque, materialised in pre-incubation programme, comprising the valences of counselling and business development.

The winner idea of FCT-Entrepreneur Program 2016 edition was named “Preeclampsia Handy Control”. It focuses on the development of a biosensor to monitor preeclampsia in pregnant women. A condition that can affect all pregnant women and that, in the final analysis, can lead to death and the baby. The winning team consists of students Cátia Figueiredo (Micro and Nanotechnology Engineering), Inês Rosete (Chemistry and bio-organic), José Miguel Cunha (Micro and Nanotechnology Engineering), Vânia Silva (Biotechnology) and Vasco Santos (Micro and Nanotechnology Engineering).

As it can be easily understood, the 5 students are affiliated to 3 different MSc degrees, thus forming a multidisciplinary team as it was required in the beginning of the Program.

Figure 3 Overview of the final session.

3. Conclusions and Future Plans

Such an ambitious program should not finish in the middle of the 4th year, but proceed beyond. The FCT-Entrepreneur Program is running for 4 years now, so it can be said it is mature enough to require further iterations and an extension to the 5th year, eventually linked to the dissertation thesis whenever possible. In such a case it is compulsory a revision of the curricular profile, so then there will be additional ECTS for supporting the advanced FCT-Entrepreneur Program. Furthermore, such a challenge does require the leverage of specific funds to sustain the subsequent development stages of the existing business ideas, which is the case of pre-seed funds.

Another challenge is the internationalisation and the possibility to intertwine this advanced programme with similar initiatives arising from other countries, should there be suitable financial instruments to support the exchanges and/or the ideas contests.

Some work is being developed already in this sense, namely under the framework of a H2020 project named DIGISTART (Support Ecosystems for Digital Startups. This project has a duration of 30 months, having started in January 2015. The coordination is assured once again by DEMI at FCT-UNL. DIGISTART aims at to support European-Wide digital ecosystems through a set of coordinated activities targeting both Lisbon and Malmö (Sweden, namely the Clusterland incubator).

It looks at to harness also the capabilities of the largest European online platform for startups and web entrepreneurs (the platform F6S), in what concerns the delivery of online support to startups.

DIGISTART project is linked to Digital NOVA – University Pre-Accelerator, which consists of a pre-acceleration program for digital entrepreneurship whose implementation is planned to be

effective in 2017/18 academic year (pilot-testing started last April). 5th year students, recent graduates and even PhD students from the various schools of NOVA University can be enrolled. The programme consists of 3 different modules, that is: 1) Business Design (setting-up the teams, definition of ideas and of the business model); 2) Boost (acceleration period, with multidisciplinary sessions targeted to the development of the business concept) and 3) Start (testing of the business concept within the market, public presentation and final pitch).
The way ahead is thus to secure the sustainability of both initiatives (DIGISTART and Digital NOVA) and to enlarge its focus to other areas of knowledge embedded within the graduation and post-graduation programmes of NOVA University of Lisbon various schools. The aforementioned pilots are one year old at the most, so it is the perfect timing for moving further in an attempt to comply with the framework of Universities' Third Mission as it was discussed by Laredo (2007) and Molas-Gallart (2005).
Last but not the least, the Administration Board of FCT-UNL as well as the responsible structure for the EEP-FCT is looking at delivering some publications about the programme, with the course syllabi and a quotation of some examples of successful business ideas generated along time, so the future generations can better understand and innovate by having a retrospective look into the past.

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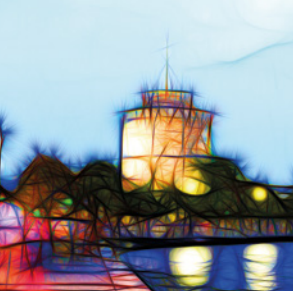

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INSTITUTIONAL DETERMINANTS OF KOSOVO SME GROWTH

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The paper aims to study the influence of the institutional environment factors on the growth of small and medium enterprises (SMEs). Kosovo, as a country in transition is characterized by difficult social and economic conditions, were used as a case study in this paper. The main institutional obstacles faced by SMEs in Kosovo that are involved in international trade will be analyzed from the perspective of the New institutional economies (NIE). The study is based on interviews of firms in Kosovo, using a structured questionnaire, conducted in 2015. The paper's key findings show that informal activities caused by low levels of professional and ethics of officials in respective institutions, as well as poor enforcement of regulations, have significant impact on increasing transaction costs, which in turn represents a major obstacle to the further growth of SMEs.

Keywords
Economic Growth, Institutional Barriers, Kosovo, Small and Medium Enterprises (SMEs)

1. Introduction

Blanchard [1], states that the growth and development of SMEs represents an essential element for transition countries, enabling the distribution of the resources created by the previous socialist economy into the new privatized sector of the restructured firms. In this respect, many of the new businesses were established in a new created business environment, while the existing firms have only changed their operational activities making them fit into the modern competitive market economy [2]. The growth of SMEs does not occur similarly in all countries. In countries in transition, different contextual obstacles impede the growth of firms. These factors include business environment factors, amongst which the most important are institutional ones. These impediments are present as a result of a hostile and unpredictable environment for doing business; an environment that is characterized by weak institutions and poor enforcement of laws, regulations and property rights, and these are present particularly in vulnerable post-war countries like Kosovo [3].
To analyze the impact of both formal institutions (e.g. laws and regulations) and informal activities (e.g. red tape, bribery, corruption, etc.) on the development of entrepreneurship in the transitional environment, numerous researchers have used the institutional perspective based on the institutional theory [4, 5, 6]. Given the other factors that influence the development of entrepreneurship, there were efforts made by different authors to account for its positive contribution to economic growth, as well as for its negative, unproductive, and, furthermore, destructive effect [7, 8, 9].

It should be emphasized that even after the declaration of independence in 2008, SMEs in Kosovo that are involved in international trade continue to face institutional barriers and other obstacles created by the business environment, including complex and inefficient regulations, difficulties in access to financial resources, lack of professional skills, new technical and technological knowledge, as well as difficulties in selling goods and services to local, regional and international markets. The case of Kosovo can, therefore, serve as a useful example for other countries that are confronting similar difficulties and that have similar socio-economic situation.

2. Kosovo economic transition and SMEs in International Trade

After the ongoing destruction of the economy of Kosovo, since 1990 until the end of war in 1999, the production in Kosovo became almost inexistent and traditional foreign markets for exports were lost. The largest part of the production which had export potentials capacities was destroyed, and, on the other hand, the new genuine export capacities did not develop. Entrepreneurship in the former Yugoslavia has had its great momentum after functionalizing the law on enterprises in 1988, creating the basic conditions for the establishment of private businesses [3]. Soon after, a large number of private enterprises were established in Kosovo as a result of the severe conditions to find employment in social ones. It is necessary to stress here that after the 90's Kosovo Albanians were dismissed from their work positions in state institutions, and the only way to survive was self-employment. This suggests that entrepreneurship of that time was more a result of repression by the Serbian regime [3]. There is no clear picture of entrepreneurship and enterprise development during this time. Also a significant number of Kosovo businesses of this time operated informally, avoiding tax obligations to the power of the authorities [3].
The violent administration of the previous regime in Kosovo before 1999, and then the 1999 war, has had major consequences for the SME sector and the economy. The reasons were numerous ranging from the political, economic and historical. Also, very bad management of social enterprises after the war resulted in the destruction and inefficiency of the enterprises, paving the way for the immediate start of their privatization by the Kosovo Trust Agency (KTA). On the other hand, for many years, Kosovo was not part of regional initiatives aimed at liberalizing trade, mostly due to the unresolved political status. There was no significant Foreign Direct Investment (FDI) in Kosovo until 2005, as in many other countries in transition, which is a necessary condition in the wake of the economy and particularly for the growth of the manufacturing sector and exports. Informal economy (35-40 percent) is also a dimension which should be mentioned here [10]. At this time the conditions for growth and development of enterprises were very difficult.
Kosovo, as a country that declared its independence quite recently (on February 17 2008), inherited a myriad of problems from its recent past, which also relate to numerous institutional obstacles. Most of these obstacles result from the lack of experience of the newly produced staff with low professional level in governmental institutions, lack of adequate laws and their uncertainty, as well as difficulties that result from ineffective implementation of applicable laws. In addition, SMEs in Kosovo continue to face institutional barriers and other obstacles created by the business environment, including complex laws and inefficient regulations, difficulties in accessing financial resources, lack of quality education, high employment rate, the lack of experience in running businesses, lack of regulatory supply of electricity, poor

knowledge and lack of experience in the use of new technologies, and difficulties in placing the goods in local, regional and international markets [3].

3. Theoretical framework and literature review

Institutional framework remains the most important factor for the growth of enterprises in every country. Here are included formal rules such as constitutional laws, individual rights (i.e. property rights) and other legal acts that derived from the formal rules such as obligations of economic entities *vi.savi* the state obligation deriving from the contractual relationship, obligation from different membership and others [11]. At the same time informal rules with their elements (i.e. social mentality, custom and other elements) have equal impact on the growth of enterprises [11]. The impact of informal rules is more evident in transition and less developed countries. Very often the informal rules are being formalized due to the lack of institutional formal rules [11]. Again this is characteristic for countries in transition and less developed countries.

Performance of institutions in transition countries is usually very low, and in particular they remain week in terms of designing and implementing of state policies. This weakness has a great impact on economic development of these countries which results with different constraints and barriers that affects growth of SMEs [12]. The low level of institutional performance affect negatively the developed SMEs, this is more evident on the area of entrepreneurship, business laws and taxation system [6]. These areas have shown to be too complicated and not practical for functioning of the businesses and this has had more destructive impact in the growth and performance of SMEs. The adoption of very high standards from western countries in to a transition environment has resulted with issuance of complicated rules and laws that has affected the development of activities of entrepreneurship and business operation. The inability to respect and fulfil this rules on one side and inability of formal institutions to enforcement them has resulted with uncontrolled activities, mainly corruption and nepotism [13, 14, 15].

Baumol [7], provides an analysis of the role of institutions in determining economic development from the perspective of entrepreneurship, namely the allocation of companies' activities and the creation of professions. He has researched in detail the effect of institutions on the entrepreneurial behaviour through presenting indicators that cause the allocation of entrepreneurial activities in the forms known as productive, non productive and destructive [7]. He emphasizes the fact that in the economy the enterprise has the role of allocating resources and incentives to innovation [7].

The pay-off structure in different countries may affect in practice the company to contribute to economic growth, or it may lead it to rent-seeking, which means that non productive enterprises and also pay-off structure can result in the growth of activities that are harmful to enterprises, namely destructive activities. Based on Estrin et al.[16], institutions can influence the entrepreneurship and SME development, either by hampering the establishment of new firms, by lowering the total number of start-ups, or by hampering the growth of existing firms. Thus, according to Baumol [7], the state, as the agency which has a crucial role in creating "*the rules of the game*" in shaping the business environment, should design the appropriate rules for stimulating the growth of productive entrepreneurship.

4. Methodology and hypotheses development

4.1 The data

In this paper the data are based on SMEs survey developed in accordance with various border agencies, business and trade alliances. The time to fill in the questionnaire was between July and August 2015, and data from the answers in surveys have been analysed in September 2015. The sample was designed to study the profile of SMEs active in international trade and their growth performance. The sample represents more than 5 percent of the total population of SMEs sector active in international trade. The sample was randomly selected from the business register in the database of the Ministry of Trade and Industry (MTI) in Kosovo, where more than 6000 active firms are involved in international trade.

The sample consists of 129 enterprises and includes SMEs across all regions of Kosovo engaged in international trade. In addition all sectors of business activities are covered and the sample was stratified twice. First three main sectors were taken into consideration in order to reflect differences between production, trade and services. Second the sample was stratified according to the EU definition namely micro, small and medium enterprise. The interviews were conducted through the face-to-face method with the key people in SME, namely owners, managers and other alternative people in each enterprise. In addition a test survey has proven that our questionnaire was reliable instrument for data collection.
In order to examine how institutional and other relevant barriers affect the growth of SME active in international trade, the following hypotheses will be tested:

H_1: The small firms have a better performance than the larger firms
H_2: The newly SMEs in international trade have shown better performance.
H_3: Managers of SMEs that have been trained have shown better performance.
H_4: SMEs that uses special trade agency services have resulted with better performance.
H_5: SMEs that have to complain with cross border agencies rules causes' low performance.
H_6: Poor implementation of customs valuation methods causes low performance on SMEs.
H_7: SMEs that need different institutional authorizations results with low performance.
H_8: SMEs that often complying on issued of institutional decision have shown to have better performance.
H_9: Enforcement of regulations and procedures in unfair ways by triggering illegal activities by institutional officials causes low performance of SMEs active in international trade.

4.2 The econometric model

The econometric model:

$$\ln performance_i = \alpha_0 + \alpha_1\ employees_i + \alpha_2\ age_i + \alpha_3\ tradeservice_i + \alpha_4\ trainning_i + \alpha_5\ unfaira_i + \alpha_6\ cvaluation_i + \alpha_7\ idecision_i + \alpha_8\ ccborder_i + \alpha_9\ authlicenses + \varepsilon_i$$

***Dependent variable**:* is the natural log of performance used as a proxy for growth. Growth is determinate as rate of turnover growth in the beginning and the end of 2015 of firms that are active in the international trade.

Independent Variables: are all institutional and environment variables are of qualitative nature: *trade agent service*, *trainings of managers, unfair activities, customs valuation, institutional decision, cross border, authorized licenses,* while the variables such as the number of *employees, trade services* and *firm age* are of non qualitative nature. Most of the variables are converted into dummy variables taking the value of 1 if the respective barrier to firm turnover growth is recorded and taking the value of 0 where recorded otherwise.

5. Empirical results and conclusions

To estimate our model as determinate below, we used the robust least squares regression techniques available in Stata 12. The stepwise ordinary least square (OLS) estimator is chosen because the previous results have shown some problems of heteroskedasticity and normality. The next step forward clarifying the situation is that we can start immediately to perform our model again and removing stepwise the least significant variables. Hence, the Breucsh- Pagan/ Cook-Weisberg test for heteroskedasticity in our data reject the zero hypothesis of constant variable due to the robust standard techniques. In addition to further check of possible data problems regarding the multicollinearity we use the Variance Inflated Factor (VIF).

As we can observe further the OLS regression results with the coefficients and standard errors for each of the variables are presented in Table 1. In the beginning results provides us with the following findings: hypothesis regarding the firm related characteristics such as size and age are being confirmed and have a negative sign meaning that smaller and younger firms have better growth performance than older and larger firms. The coefficients are statistically significant indicating that variables size and age have a negative and nonlinear relationship of the firm [17].

Further we find the positive sign and statistically significant coefficients of SMEs that are using trade special services to resolves complicated trade regulations, customs procedures and other institutional issues; these increase the chances to have better performance. The trainings dummy variable proved to be positive sign and statistically significant but only 0,1 percent level, indicating that specific human capital knowledge in business environment of Kosovo has not reach the expected merit [3, 17]. The variable unfair activities of institutional officers are confirmed and the coefficients are significant with a negative sign even at 10 percent level. The variable related to customs valuation methods has a negative sign but significant only at 1 percent level, which might be also as a result that traders do not present transaction value of imported goods. The variable institutional decision is also significant and has a positive sign even at 10 percent level

Table 1 Institutional barriers on SMEs growth

	Institutional barriers to SME performance		
	Coefficients	t-statistics	P - value
Constant	3.978565	11.44	0.000
Employees2010	-.0225031**	-2.27	0.025
Age of firm	-.0888694**	-2.75	0.007
Trade services	.0000504**	2.68	0.008
Trainings of managers	.1976403	1.31	0.192
Unfair activities	.3714675***	2.97	0.004
Customs valuation methods	-.256356*	-1.82	0.072
Institutional decisions	.425441***	3.02	0.003
Cross border compliance	-.4393681***	-3.41	0.001
Authorization and licenses	-.5926471***	-4.58	0.000
N = 129			
R^2 = 54.8%			
Estimator : Stepwise OLS			
Notes:*** Level of significance at 0.01%, ** 0.05%, * 0.1%			

Source: Own calculation

This study is a wealthy point to the scientific literature over the growth barriers of the SMEs involved in international trade, while exploring institutional factors in particular. The study fulfills a gap on the present research focused in the transition and marginalized places. Our result shows that it is a similarity of the growth barriers of SMEs in Kosovo, according to informal and formal factors on every sector of SMEs in international trade. These factors are burdening the growth of SMEs. The role of informal factors is particularly noteworthy, as they are present on the day-to-day activity. In the future, it would be preferable that the importance should be directed toward rightly implementing the law on the side of the officials and respecting the ethic code of their work. As in any research work, this paper also had its own limitations; it does however follow the growth of SMEs involved only in international trade. The sample contains firms that are active long enough to be interviewed and not those firms that operate informally, etc.

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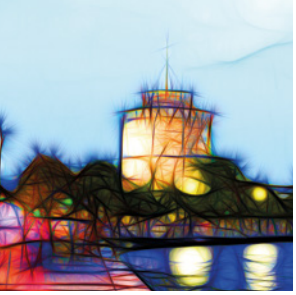

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SMART SPECIALISATION STRATEGIES IN THE POST-LINEAR ERA OF RESEARCH AND INNOVATION

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Smart specialisation is an entrepreneurial discovery process that makes it possible to identify where regions can benefit from specialising in specific areas of science and technology. The European Commission suggests the development of Research and Innovation Strategies for Smart Specialisation (RIS3) should concentrate resources on the most promising areas of constructive advantage, e.g. on clusters, existing sectors and cross-sectoral activities, eco-innovation, high value-added markets or specific research areas. This calls for regions to assess their assets, single out competitive advantages and highlight the cohesive qualities of territories. The RIS3 Key and Self-Assessment Guides both advise regions on how to prepare for smart specialisation, by identifying existing strengths and the potential for future development efforts, spotting remaining gaps and bottlenecks in the innovation system and mobilizing the relevant institutions involved in the entrepreneurial discovery process. This paper sets out the results of the Online S3 project's open consultation on these guides and the 29 RIS3 methods developed to guide this process of entrepreneurial discovery under the post-linear era of research and innovation.

Keywords
Entrepreneurial Discovery Process, European Commission, Online S3 Project, Open Consultation, Regional Innovation, RIS3, Smart Specialisation

1. Introduction

Smart specialisation is an entrepreneurial discovery process that makes it possible to identify where regions can benefit from specialising in particular areas of science and technology **[6; 7; 8; 9]**. The European Commission (EC) suggests that the development of Research and Innovation Strategies for Smart Specialisation (RIS3) should concentrate resources on the most promising areas of comparative advantage, e.g. on clusters, existing sectors and cross-sectoral activities, eco-innovation, high value-added markets or specific research areas. This calls for regions to assess their assets, single out competitive advantages and highlight the cohesive qualities of territories **[1; 5]**.

The RIS3 Key and Self-Assessment Guides both advise regions on how to prepare for smart specialisation, by identifying existing strengths and the potential for future development efforts, spotting remaining gaps and bottlenecks in the innovation system and mobilizing the relevant institutions involved in the entrepreneurial discovery process **[9; 10; 12]**. This paper sets out the results of the Online S3 project's open consultation[1] on these guides and the 29 RIS3 methods developed to support this process of entrepreneurial discovery under the post-linear era of research and innovation. As a methodological review of RIS3, the findings of this consultation reveal the following:

- while the RIS3 Key and Self-Assessment Guides are all conducted in the post-linear era and offer a radical break in the production of knowledge, characterised by the transition from mode 2 to the triple helix model of research and innovation **[14]**, the guidance notes emerging to advise on such developments, also highlight something else: a shift from the triple to quadruple helix as the methodological basis to underpin such a strategic development;
- the European Commission now recommends adopting a quadruple helix approach for the second round of RIS3 assessments **[9; 10]**. For those involved in RIS3 design, this requires an understanding of the distinction between the triple and quadruple helix models, as a broad-based research and innovation strategy for new knowledge production;
- against this backdrop, it is equally important the European Commission is aware of how those involved in such knowledge production perceive these models and whether they see the direction of travel in entrepreneurial discovery as making a significant methodological contribution to the institutional framework for smart specialisation. Furthermore, if this development also offers a platform for sustainable and inclusive growth.

Such awareness is what this post-linear reflection is designed to capture. In offering such a reflection, it draws upon the results of an open consultation on the 29 methods the Online S3 project advances to advise stakeholders on how to prepare for the second round of RIS3 assessments.

2. The Online S3 project's open consultation

Online S3's open consultation involves:

- the publication of the 29 methods currently available to support the design and implementation of RIS3;
- a review of the methods by way of target interviews and questionnaire surveys with selected academics, analysts and specialists (approximately 20);
- four workshops with user-groups involved in the design and implementation of smart specialisation strategies;

[1] Online S3 is a Horizon 2020 research project. This project aims to develop an e-policy platform augmented with a toolbox of applications and online services that can assist European national and regional authorities in elaborating and revising their smart specialisation strategies. More information can be found on CORDIS, the European Commission's primary portal for results of EU-funded research projects: http://cordis.europa.eu/project/rcn/203172_en.html

- a social media campaign.

This open consultation deploys the software provided by Medium.com. This grants the stakeholder community using the 29 methods full access to the material. It also invites the user-community to review the methods and, for this evaluation, to proceed not only by way of interviews, questionnaires and workshops, but also through a social media campaign.

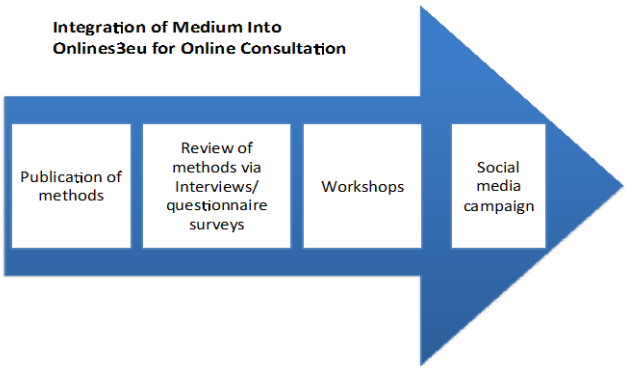

Figure 1 Main components of the open consultation

2.1 Publication of the methods

The publication of the 29 methods follows the consultation protocol offered by Medium (see https://consultation.onlines3.eu). This is set out in Figure 2.

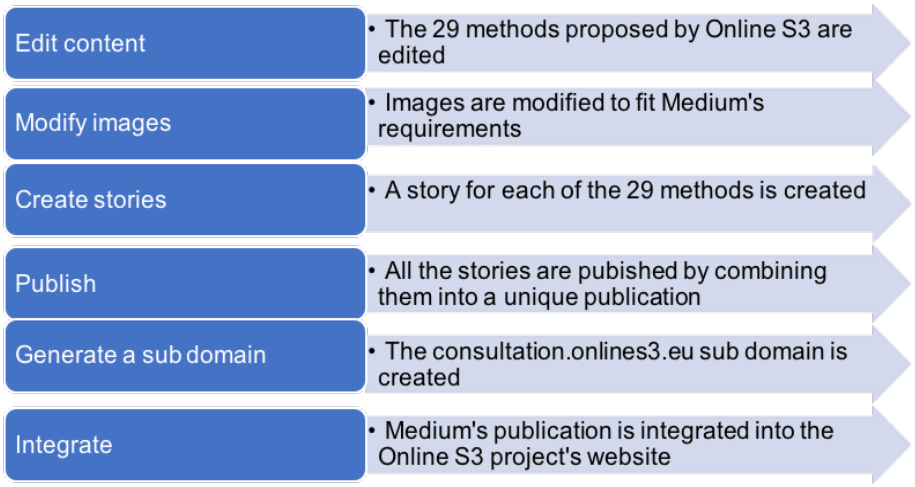

Figure 2 Online open consultation of the Online S3 methods

2.2 Interview/questionnaires

First pilot as a series of interviews with selected academics, analysts and specialists, initial feedback on the publication of the 29 methods indicated the material lent itself to a questionnaire survey as the most appropriate means to undertake the methodological review.

As an integral part of this methodological review, the questionnaire survey provides the opportunity to reflect on the process of entrepreneurial discovery under the post-linear era of research and innovation, and the production of knowledge relating to the helices of smart specialisation strategies **[11; 13]**. The reasons for this are as follows:

- while the initial RIS3 self-assessments were all conducted in the post-linear era of research and innovation and do represent a radical break in the production of knowledge, the guides emerging also highlight a shift from mode 2 to the triple and quadruple helix as a basis for such strategic developments;
- this suggests the first round of RIS3 assessments were to some extent "caught in the transition";
- the European Commission now recommends the quadruple helix should be adopted as the constituency of stakeholders for RIS3 strategies and the second round of assessments ought to be conducted on this basis;
- for those involved in RIS3 design, this means there is a pressing need for any further development to be fully aware of the differences, arguments for and against the triple and quadruple helix as a broad-based research and innovation strategy for new knowledge production;
- it is also equally important the European Commission is fully aware of the views and opinions on the value of these models. In that respect, whether stakeholders support the direction of travel this takes on and if this movement offers a platform for sustainable and inclusive growth.

This "full awareness" is what the questionnaire survey is designed to capture, solicit views and opinions on. This provides the means for the stakeholder community to deliberate the terms of reference for the second round of RIS3 assessments and compile reports on the strengths and weaknesses of the user-centric drive towards the mode 3 research and innovation it promotes under the auspices of the quadruple helix **[2; 3; 4]**. With this in mind, the questionnaire addresses:

- the RIS3 KEY for Self-Assessment **[12]**;
- the European Commission's Guide to Research and Innovation Strategies for Smart Specialisations **[9; 10]**;
- the Online S3 user-centric drive towards RIS3 Assessment **[15]**.

The initial results of a bibliometric analysis found 145 scientific experts involved in smart specialisation research, who were invited to complete the questionnaire. To date (April 2017), 17 completed surveys have been returned. As it has not yet been possible to conduct a detailed analysis of the questionnaire responses, the following shall only report on the initial headline results of the questionnaire survey:

- 75% found the RIS3 KEY Guide either extremely helpful, or very helpful, because it mobilizes all the stakeholders who are most capable of championing research and innovation under the triple helix model of regional innovation systems;
- 75% found it very important for the scientific, knowledge production and creative sectors to be the champions of regional innovation;
- 60% found it very important for these sectors to cluster together as enterprises able to leverage technological breakthroughs across regions;
- 70% propose to adopt these technological breakthroughs as policy priorities of any smart specialisation strategy;

- 60% said it is either very important or important for any such technological breakthrough to be the subject of a governance regime of a joint board acceptable to all stakeholders;
- 65% said this joint board should be responsible for designing a research and innovation strategy for smart specialisation;
- 75% said it is very important the joint board provide a clear statement about the future challenges the research and innovation strategy has to meet;
- 75% of those surveyed believe their regions have the scientific knowledge and creative skills to meet these challenges;
- 70% see the triple helix as a marked improvement on previous models of regional innovation, strong in terms of linkages between university and industry, but with weaker connections to government. However, the responses are divided (60/40) in terms of whether-or-not civil society can strengthen this. This aside, 70% of respondents suggest the public should have greater influence over a broad-based innovation policy, but the rate of innovation in Europe may not be sufficient to allow for this;
- any proposal to leverage such an intervention by way of the quadruple helix, also produces a 60/40 split in favour of this model, despite 80% of respondents suggesting it is only this broad-based innovation policy that can widen the participation which is sought;
- with regards to the inclusion of civil society in the Guidance Notes, 70% believe this constituency is added in order for innovations to meet the grand challenges of civil society and achieve this by extending demand beyond industry and business. That is extended out into the research and education sector, business, government and public institutions of a quadruple helix, which is able to bridge technological gaps in the co-design of research and innovation strategies. Able in that sense to offer a platform which gains public trust in research and innovation and clears the democratic deficit otherwise associated with such strategies;
- whilst acknowledging this, a 50/50 split exists in recognising the virtues of such an inclusive growth strategy, but this aside, there is a general agreement that inclusive growth offers the best prospect of broadening participation as part of an open research and innovation strategy, which is sufficiently comprehensive to meet the social challenges that Europe faces;
- 70% suggest the quadruple helix offers a more coherent governance system for smart specialisation and 60% of the respondents are familiar with the 29 methods Online S3 selects to promote this. The majority of the respondents see this coherence as being linked to the broadly participative nature of the methods, which are connected to the RIS3 steps the user-community is not only now familiar with, but know about. This alignment makes it possible for users to participate in a process of co-design that not only bridges the technological gap in research and innovation, but which also allows the community to restore public trust in such actions.

Table 1 The 29 methods proposed by Online S3

PHASE	DESCRIPTION	METHOD
1. Governance	The term "governance" refers to government and stakeholder engagement. Governance implies also a quadruple helix approach as the key process of innovation production. This step should be placed at the start of RIS3, setting the framework of the entire process.	1.1. RIS3 vision sharing 1.2. Stakeholder engagement 1.3. RIS3 debate at a glance 1.4. RIS3 legal and administrative framework related to ESIF
2. Analysis of context	"Analysis" is an established and standard term of background information necessary for any strategic planning process. "Context" refers to regional/national specific conditions and existing institutional setting to be taken into account.	2.1. Regional asset mapping 2.2. Research infrastructure mapping 2.3. Clusters, incubators, and innovation ecosystem mapping 2.4. Benchmarking 2.5. Regional scientific production profile 2.6. Specialisation indexes 2.7. SWOT analysis
3. Strategy formulation	"Strategy" formulation (instead of policy formulation) denotes the character of RIS3 as strategy and as a project-oriented intervention. "Shared vision" makes clear the participatory approach in defining the vision and setting objectives.	3.1. Collaborative vision building 3.2. Scenario building 3.3. Delphi - Foresight
4. Priority setting	Definition of activity, focus and priorities of smart specialisation.	4.1. EDP workshops 4.2. Extroversion analysis 4.3. Related variety analysis
5. Policy mix	"Policy mix and action plan implementation" denote the sequence of actions for implementing the strategy. "Action plan" stresses the need for a structured project-driven approach to RIS3 implementation.	5.1. RIS3 intervention logic 5.2. RIS3 action plan co-design 5.3. RIS3 budgeting 5.4. RIS3 administrative framework conditions 5.5. RIS3 calls consultation 5.6. RIS3 innovation maps 5.7. RIS3 open data tool
6. Monitoring and evaluation	"Monitoring and evaluation" (instead of evaluation) refers to the data collection process: the need to create a repository of data to monitor the key processes of smartness.	6.1. RIS3 monitoring 6.2. Definition of RIS3 output and result indicators 6.3. Balanced scorecard 6.4. RIS3 beneficiaries and end users' satisfaction online survey 6.5. RIS3 social media analysis

2.3 Workshops

The workshops have the following aims: (1) raise awareness of the 29 methods (see Table 1); (2) review the status of the methods from the user-perspective; (3) capture the outcomes of this review as a summative evaluation of the methods; (4) solicit the thoughts, views and opinions of the users on the strengths and weaknesses of the methods; (5) reflect on the

potential there is for Online S3 to develop the methods as good examples of entrepreneurial discovery and to take advice from the user-group on what they consider necessary for the methods to be user-centric.

Workshop events

- Central Macedonia (Thessaloniki): 10th December 2016 and 10 th January 2017
- Scotland (Edinburgh): 26th January 2017
- Slovakia (Bratislava): planned but not convened[2]
- Slovenia (Ljubljana): 19th January 2017

Table 2 Stakeholder representation at the workshops

WORKSHOPS	STAKEHOLDERS				TOTAL
	University	Industry	Government	Civil Society	
Greece	0	15	7	0	22
Scotland	0	5	6	0	11
Slovenia	5	15	1	0	21
Slovakia[3]	3	3	6	0	12
TOTAL	**8**	**38**	**20**	**0**	**66**
	12%	**58%**	**30%**	**0%**	**100%**

User-group representation

Representing the four stakeholder groups at the workshops proved challenging. An analysis of the workshops indicates only University, Industry and Government were represented. From the 66 who attended the workshops, 12% are from Universities, 58% from Industry and 30% from Government (see Table 2). From this, it is evident that Online S3's commitment to the quadruple helix is slightly compromised by the over representation of Industry and Government as stakeholders relative to those of Civil Society and to a lesser extent Universities.

Results of the workshops

The results of the workshops are shown in Table 3. Analysing the results by score, the average is 4/5 (very useful), with only 35% of the methods commanding a higher score. In contrast to this, 32% of the methods also fall below the average. This suggests the user-community is generally supportive of the methods.

Table 4 provides an extract of the specific comments. Here, criticisms of the methods include their design, vis-a-vis the form they take. As one participant representing the Scottish Government and attending the Edinburgh Workshop said: "the fact they are full of technical jargon and excessively lengthy" is not helpful. In addition to this comment, the user groups from each of the workshops made the following observations:

[2] This user-group workshop for the Online review of S3 methods did not convene due to developments of RIS3 by the nation-state. In an attempt to fill this gap, Slovakia choose instead to post feedback via the consultation tool hosted on Medium.

[3] Slovakia's figures are drawn from the online consultation they participated in.

- currently, there are too many methods;
- the descriptions tend to be technically over-specified and too complex;
- simplification of the methods would be helpful, as too would a much clearer statement of who they are intended for;
- this means segmenting the methods by user-profile, role and function;
- these profiles, roles and functions also require to flag up the added value to the users, either in scientific and technical terms, potential for wealth creation, investment in and commercial exploitation of innovations to meet social challenges;
- without this, there shall be no "buy-in";
- it would be a good idea to write the methods descriptions not from the expert's point of view, but specify them from the perspective of the user, as this would make it easier to navigate a critical path from one to the other;
- this means turning the situation around by: (1) keeping the technical matters in the "back office"; (2) pushing what you want the method to communicate up into the "front-of-shop", where it can be both seen and heard; (3) shifting attention away from the problem and to the solution;
- any such user-centric message also requires not to be so text-driven, but offer a rich "multi-media" experience, vis-a-vis better balance between the written text, visual images and symbols available to communicate the value-adding potential of the solution each of the methods offers;
- in this way, the methods ought to be more radical and represent user-centric communications as social innovations;
- any wider dissemination should seek to streamline the methods so the critical nature and pivotal status of these social innovations can be seen as not only being smart in terms of the priorities they set, but in relation to how these preferences sustain the entrepreneurial discovery process;
- this user-centric message needs to be inclusive and consistent across each of the methods. Indeed, as one participant went on to suggest, only by communicating the methods in this way it shall become possible for the social media adopted (Medium) to create the very stories that allow for the publication of them as methods, which others can also speak about as part of an online consultation.

Table 3 Summative evaluation of the 29 RIS3 methods

METHOD	AVERAGE SCORE	Not useful	Not very useful	Neutral	Useful	Very useful
1.1. RIS3 vision sharing	4					
1.2. Stakeholder engagement	4.3					
1.3. RIS3 debate at a glance	4.3					
1.4. RIS3 legal and administritive framework related to ESIF	3.7					
2.1. Regional asset mapping	4.7					
2.2. Research infrastructure mapping	4.3					
2.3. Clusters, incubators, and innovation ecosystem mapping	4.3					
2.4. Benchmarking	4.3					
2.5. Regional scientific production profile	4					
2.6. Specialisation indexes	3.7					
2.7. SWOT analysis	3.7					
3.1. Collaborative vision building	4					
3.2. Scenario building	3.7					
3.3. Delphi - Foresight	4					
4.1. EDP workshops	4.7					
4.2. Extroversion analysis	4					
4.3. Related variety analysis	3					

Table 4 Extract of detailed comments

METHOD	WORKSHOP			
	Greece	Scotland	Slovakia	Slovenia
1.1. RIS3 vision sharing	*Very useful but it has description and operation difficulties*	*Requires case study examples to clarify the method*		
1.2. Stakeholder engagement	*Very useful both the methodology and the instrument (opinion of experts is required)*	*Sections 1.1 and 1.2 could be merged. People not necessarily running these methods in the correct steps/logical orders*		
1.3. RIS3 debate at a glance	*Very useful methodology but it has description and operation difficulties*			
1.4. RIS3 legal and administrative framework related to ESIF				*Concern about translation and linguistic issues*
2.1. Regional assets mapping			*When mapping the research infrastructure in various countries, there should be included also the data about overall yearly budget spent on supporting programs by each institution*	

3. Social media campaign

Table 5 sets out the social media strategy deployed for the online consultation. From this overview, it is evident that generating comments from the user-community, which constitute a mutual exchange, is far more challenging than achieving reads and likes. Given that Medium is the default social media for the consultation, the plan for future deliberations on Online S3 shall proceed by way of LinkedIn and Twitter.

Table 5 Social media campaign

SOCIAL MEDIA	VIEWS	LIKES	COMMENTS
Medium	1,000	17	12
LinkedIn	7,000	25	8
Twitter	80		
Facebook	700	15	5
YouTube	21	2	

4. Conclusions

The RIS3 Self-Assessment Guide helps regions to prepare for smart specialisation by identifying existing strengths and the potential for future development efforts, identifying remaining gaps and bottlenecks in the regional innovation system and mobilizing the relevant institutions involved in the entrepreneurial discovery process. This paper has reported on the results of the Online S3 project's open consultation on the 29 methods of entrepreneurial discovery under the post-linear era of research and innovation.

The outcome of this methodological review informs stakeholders within this community on how to prepare for the next RIS3 assessments and report on the strengths and weaknesses of the user-centric drive towards mode 3 research and innovation in smart specialisation.

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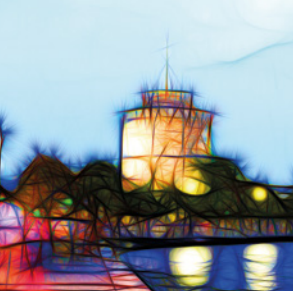

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A CAPABILITY MATURITY FRAMEWORK FOR KNOWLEDGE TRANSFER

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The Technology Transfer Office (TTO) at Maynooth University manages a Knowledge Transfer (KT) programme for a consortium of four partner Research Performing Organisations (RPO). Each partner is different in size, research strengths and strategy. At the beginning of our KT activity, we posed the question - *How will we measure effectiveness, and how can we benchmark against larger and successful international TTO's*? To answer this question, and to help define and manage quality development at each of our partner RPOs, we have created a "Knowledge Transfer Maturity Framework". Our framework captures the essentials of good practice, which are TTO and RPO size invariant. The framework has helped us to establish current maturity levels in key KT processes, and how we measure deficiencies and subsequent improvements. The framework also allows us to benchmark against other TTOs, not just based on metric outputs, but across the multi-dimensional aspects of an effective TTO. We have also used ratios of existing metrics aligned to research spend as an additional and useful benchmarking tool.

Keywords
Knowledge, Maturity Frameworks, Metrics, Transfer

1. Introduction

Knowledge Transfer (KT) is a core activity of most Research Performing Organisations (RPO), alongside teaching (or knowledge transmission) and research (or knowledge creation). Figure 1 shows this three-way function, in which each is given equal precedence. Knowledge Transfer consists of activities such as research collaboration with industry, consultancy, licensing of new technologies, spin-out company creation and incubation.
While excellence in research and teaching are generally well defined in terms of metrics and quality, KT is more difficult to qualify. Historically the approach has been to pick certain KT outputs, normalised to research spend, and to use these as national and international comparators. Thus, knowledge (or technology) transfer organisations such as the Association of University Technology Managers (AUTM) in the USA [1], or the Association of European Science and Technology Transfer Professionals (ASTP-Proton) in Europe [2], report sets of output metrics annually, and these metrics have been adopted by universities, RPOOs, research funders and governments, as markers of KT activity. Yet, these metrics are

somewhat crude and take no account of (a) the core mission of the RPO; (b) the size and age of the RPO or the TTO; and (c) the type of research undertaken.

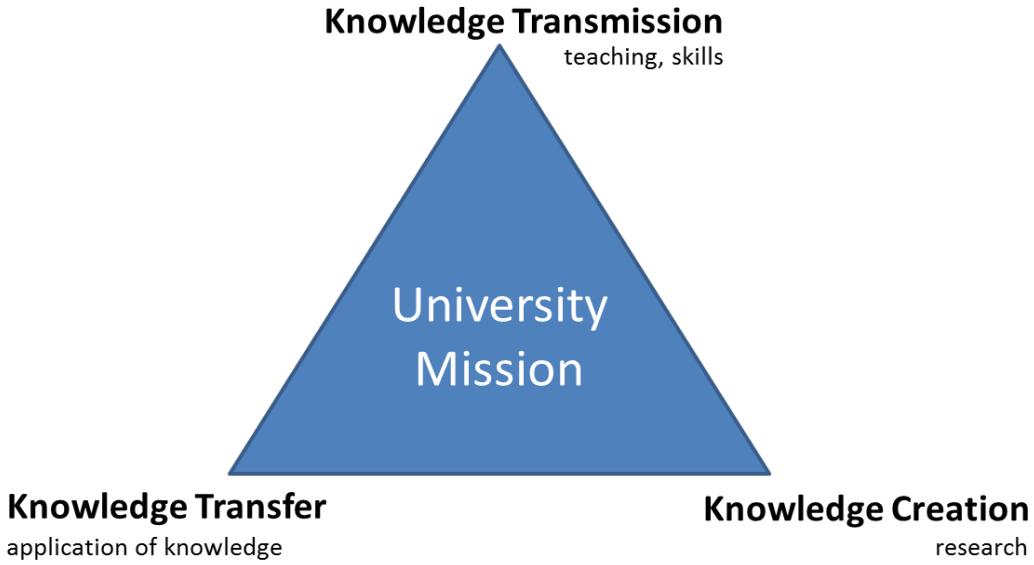


Figure 1 University mission

This paper presents two concepts for KT quality measurement and monitoring as an aid for TTOs to develop more relevant and potentially more useful approaches to quality development and benchmarking. The first is the development of a KT Maturity Framework model, similar to those used in other industries, developed by the author to help manage a consortium of different RPOs, each very different in size and with quite different missions. The second is the development of the metrics themselves, focusing not on the standard metrics, but on certain ratios, from which additional useful information can be extracted.

2. A Capability Maturity Framework for KT

Capability maturity frameworks have been developed and used in various industries, mainly in business processes and in software development. Such frameworks generally define sets of essential processes or practices, mapped across levels of maturity. Maximum maturity corresponds to a desired goal or excellence, achieved via process improvement. In parallel, technology readiness levels are used to define readiness of a specific technology for market, again via defined levels of market readiness.
Based on these ideas, we have developed a simple KT Maturity Framework, shown in figure 2 below. The model arose from our need to manage four very different RPOs and their TTOs. Firstly, there are five levels of maturity, across seven levels of process practice, of which four define the TTO excellence, two define the RPO KT processes, and one defines the TTO team skills and experience.

Quality improvement arises from self-assessment of current levels against this maturity framework and setting targets for moving up the maturity curve. We have used this framework to help us increase quality and efficiency, and it has allowed us to identify best practices and set goals to achieve those. Thus, while we can use international offices as examples of best practice, we do not necessarily need to try to emulate their KT metric performance, which will be dependent on many other factors. Nor, for example, does the model recommend a certain procedure for a specific activity; it only recommends a maturity development curve towards a goal.

The framework recognises that best practice for one institute is not necessarily best practice for another. It is also activity and quality based, and not operational based, since operational practice varies according to institute, legal structure, and jurisdiction.

	KT MATURITY FRAMEWORK	Level 1	Level 2	Level 3	Level 4	Level 5
Staff	TT Staff Experience	TT activity new to RPO, no dedicated TT/KT staff.	TT/KT staff at early experience level.	TT/KT staff with developing expertise and skills.	Staff at RTTP or equivalent.	Highly experienced and skilled TT/KT staff mix.
Office	Spin-outs / LOA Activity	Very low, sporadic and unplanned activity.	Developing TT output, first LOA deals, some spin-out possibilities.	LOAs regular and planned, emerging pipeline of spin-outs.	Several years' experience in LOA and HPSU type spin-out creation.	Large portfolio of deal experience. Well-developed activity pipeline.
Office	Industry Engagement	Emerging industry engagement.	Pockets of industry engagement.	Good industry engagement across several research groups.	RPO wide targeted industry engagement.	Large portfolio of RPO wide industry contracts.
Office	Consultancy Activity	No institutional consultancy strategy, private capacity only.	Pockets of RPO administered and planned consultancy.	RPO wide policy and mechanism for consultancy.	Managed and marketed consultancy offering by RPO.	Significant and mature consultancy activity across RPO.
Office	TT / KT Culture	TT/KT culture not well established.	TT/KT culture accepted at management and researcher level.	TT/KT activity considered in staff promotion evaluation.	RPO wide recognition that TT/KT activity is an important activity.	TT/KT embedded as core RPO activity along with teaching and research.
Institute	IP Management Processes	RPO IP management policies not in place.	First version policies relating to LOAs and spin-outs in place.	Developed IP and campus company policies.	First RPO wide processes for IP Management as per IP Protocol.	RPO broad IP management developed and monitored.
Institute	Transaction Speed and Quality	Institutional inexperience in TT/KT activity.	TT/KT contract negotiation laborious and time consuming.	TT/KT contract negotiation slow due to multiple review / sign-off.	TTO has remit to negotiate and sign off on all TT/KT deals.	Very efficient and effective TT/KT transactions.

Figure 2 A KT Maturity framework model

Our implementation of the framework involved firstly identifying where each of our four RPOs are positioned on the framework, and then setting goals for maturity advancement. This allowed us to identify strengths and weaknesses, take account of RPO differences and manage our development in quality and efficiency. While the framework is simple in outline (as most quality development systems are), having a set framework allows the TTO to

assess, monitor, develop and report progress on KT, relevant to the RPO and its TTO, and to set quality goals for itself.
Among our four RPOs are:

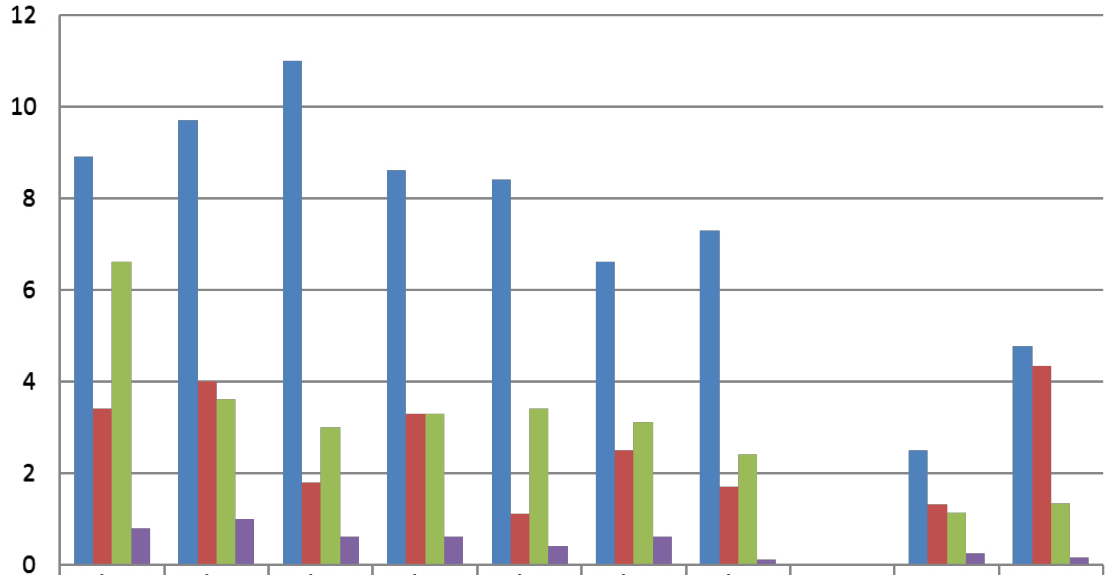
- A traditional arts, science and humanities university, with research themes across these broad areas. Research excellence exists in certain scientific and humanities themes and knowledge transfer activity focusses primarily on these areas of excellence. The TTO is eleven years old and staffed by people with extensive former industry experience, ranging from multinational corporations to start-up companies;
- An institute of technology with research excellence in informatics, communications and electronics, with significant European funding and strong industry links. The TTO is eight years old and again staffed by people with significant management and industry experience;
- A regional institute of technology with research excellence in materials and biological processing. The institute has ambitious research goals but not much experience in KT apart from links to two large multinational companies in the region;
- A small regional institute of technology with links to specific sectors in the public and private communities. Research activity is quite low, but links to industry are good and the institute is ambitious in its KT vision and the impact it can have regionally.

Thus each of the TTOs began at different points on the maturity curve and had different goals based on our remit and strategy as RPOs. The value of the framework was the identification of those differences, the level of current maturity and an inter-RPO comparison. This allowed us to review and set goals, and set out the processes and operational tasks to achieve those.

3. Standard metrics interpretation

TTOs are familiar with the annual monitoring of standard metrics, normalised to research spend. These include number of spin-out companies, number of technology licences, number of research collaborations with industry, number of inventions reported and number of patents filed. These certainly give a measure of how much of each activity occurs per research spend and one can, in theory, compare a very large research university, say in the USA, with a small teaching and research organisation, say in Ireland.
Figure 3 shows a plot of some standard metrics normalised to each €10m of research spend. The data set comes from a set of institutes in Ireland (labelled Institute 2 to 8) from 2014 [3] and from the AUTM and ASTP annual reports from 2014 [1] [2], each being a mean across their member set. Thus, we can compare each of the Irish institutes to each other and to the European and the USA mean. Firstly, the data suggests that the seven Irish institutes perform better than the “average” US (AUTM) or European (ASTP) counterparts do, and in some cases, the outperformance is very significant. Secondly, the spread among even seven Irish institutes is significant. This raises the question as to the value of the comparison and if it makes sense to be used as any kind of benchmark measure.
In fact, the comparison is rather crude and misses many factors of potential difference between all organisations, included in which are (a) core mission of the RPO, (b) source of the research funding, (c) RPO and TTO size, and (d) maturity of both the RPO and TTO. In

fact, it would be much more useful to compare one TTO with another TTO in which these differences are minimised. However, this is not easy and it depends on the availability of the data and a knowledge of other TTOs in other jurisdictions.



	Institute 2	Institute 3	Institute 4	Institute 5	Institute 6	Institute 7	Institute 8		ASTP	AUTM
IDF	8.9	9.7	11	8.6	8.4	6.6	7.3		2.50	4.76
Patents	3.4	4	1.8	3.3	1.1	2.5	1.7		1.32	4.35
LOA	6.6	3.6	3	3.3	3.4	3.1	2.4		1.12	1.33
Spin-outs	0.8	1	0.6	0.6	0.4	0.6	0.1		0.24	0.15

Figure 3 Standard metrics comparison, normalised to €10m in research spend

Based on this performance relative to international standards, the Irish KT system performs well as a whole. However, this broad scale analysis misses key important nuances and fails to recognise standards of quality and improvement possibilities, particularly for each individual institution. For example, if we compare the number of license deals per research spend at Maynooth University to the number of license deals at, say Stanford University, then we neglect too many confounding factors, such as size, research focus, and funding sources.

3.1 KT ratios that measure effectiveness

For this reason, we suggest comparison of ratios of these metrics. This allows for more valid comparisons and for the identification of opportunities for quality improvement that are more real and relevant. For example, comparing the number of license deals per say invention disclosure, a slightly different picture emerges, shown in figure 4 below [LOA is for Licenses, Options, Assignments, the usual nomenclature for this metric; IDF is for Invention Disclosure Form, a measure of the number of potential inventions reported to the TTO].

Firstly the difference between the individual Irish institutions and the US and EU mean data is much less pronounced. In general, most of the Irish TTOs convert about 30%-40% of the invention disclosures received to license deals, not so very different from the EU and US means. Secondly, only one institute really stands out (Institute 2), which in fact is a very technology and enterprise led university, with no significant arts and humanities faculties and with a very strong focus on industry collaboration.

The data also tells us a little about national systems. While Ireland performs very well compared to US and EU means in key KT metrics like licensing and spin-out activity, the TTO conversion rate from invention disclosures is similar. This leads to the conclusion that the generation of invention disclosures is higher in Ireland perhaps because of the national drive for KT impact and metrics, and the large availability of commercialisation funding and spin-out company seed funds. That is, the ecosystem culture drives these higher outputs.

By comparing this relevant ratio across RPOs we find that, firstly, the TTOs effectiveness in driving license deals per invention disclosure is relatively consistent, with some RPOs performing well, and with others that might identify some improvement goals. Secondly, the success in this conversion is related to the type of RPO concerned, and its goals and strategies. There are many other ratios that offer similarly interesting insights, such as spin-outs per IDF, or patents granted per IDF.

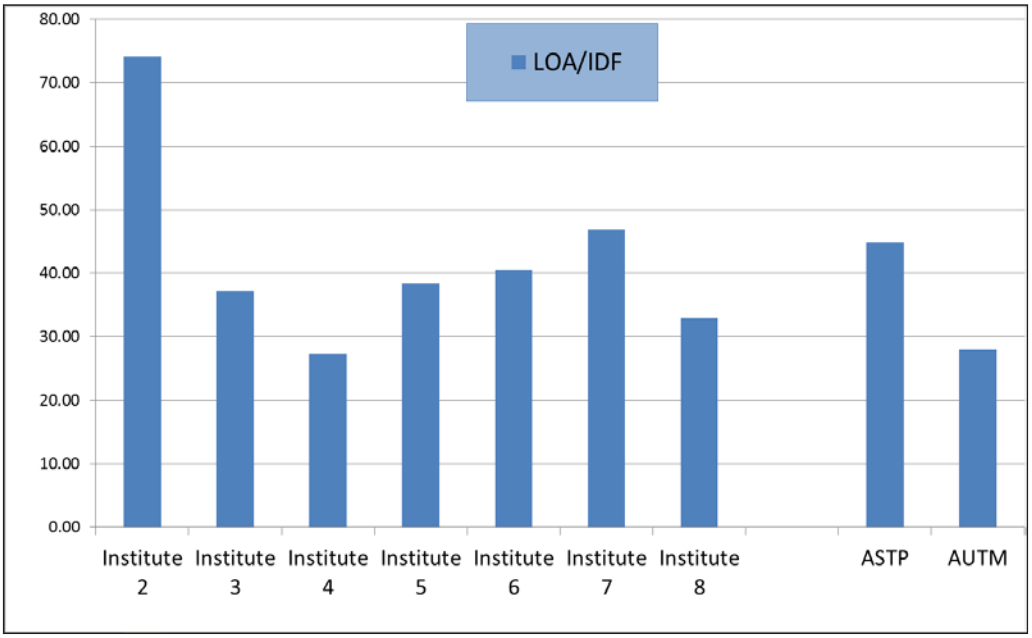
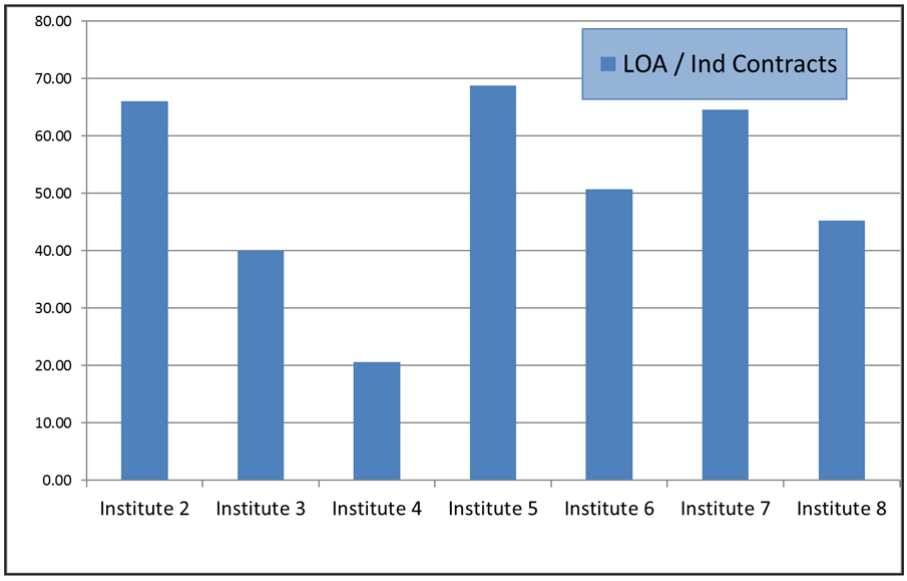


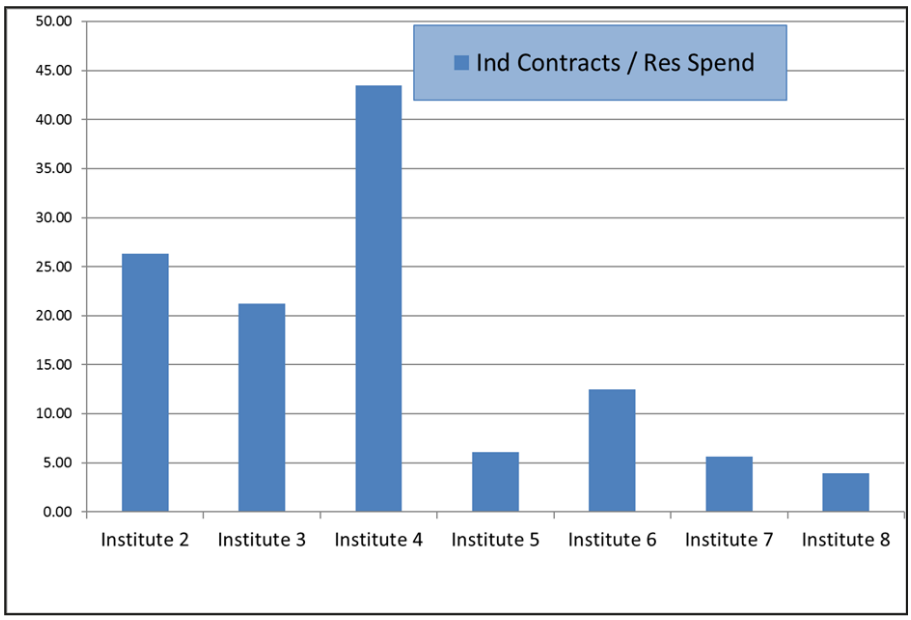
Figure 4 KT ratio comparison – KT efficiency

3.2 KT ratios that measure culture

We now compare two other ratio sets: licensing activity per industry contract, in figure 5a, and licensing activity per research spend, in figure 5b. The first might give some insights as to the depth of collaborations with industry, and if research and technology collaborations, or other types of activity, drive the relationship with industry partners. The second is a measure of licensing activity per research dollar, then divided again by overall research spend. This might demonstrate if licencing activity per research budget varies with overall research size and / or activity. In fact, apart from Institute 4 the level of collaboration effectiveness is within a certain band for all RPOs. This suggests that, while there may be room for improvement in some cases, most institutes are similar in performance.



(a)



(b)

Figure 5 KT ratio comparison – RPO culture

In figure 5b, two groups emerge - the first three institutes are relatively small, industry facing, and with large scientific programs and small or none-existing humanities programmes; the last four are larger with very broad arts, humanities and sciences programmes. The comparison of say, Institute 2 with Institute 7 is thus largely invalid, because we would be comparing institutes on outputs which are not aligned in the different overall RPO strategies. This emphasises the need to try to make comparisons across institutes that are nominally similar. In fact, figure 1 presents a uniform model of university activity, where teaching, research and KT are all given equal importance. This is rarely the case, and it is more informative to evaluate how these are given precedence at each RPO before comparisons of KT outputs are made.

However, patterns and insights do emerge. Institute 4 in above is an interesting case point. The difference between figure 5a and 5b is notable and poses a question – if, as per 5b, the institute has a lot of industry collaborations, why then, as per 5a, does it not have better licensing ratios per industry collaboration, since it is broadly accepted that most licensing activity occurs with current industry partners. The data suggests that Institute 4 should look at how it creates alliances and if some part of their process could be improved. This insight is invisible in the raw data.

3. Conclusions

The promotion of quality measurement in knowledge transfer is essential to driving excellence. Measurement of KT quality is currently not well developed beyond reporting the

standard, but of course critical, metrics. This paper has outlined the use of other tools for self-assessment, such as a KT Maturity Framework; or for comparison with other institutes, nationally or internationally, using ratios to eliminate confounding biases. Both lead to interesting and useful methods for quality measurement and improvement. The former allows any RPO to set goals and standards based on self-assessment, and we have found it particularly useful for managing a set of very different RPOs, each with different needs and visions for KT strategy. The latter is a further application of the data that most TTOs collect and present, and that KT organisations collect from their members. Several insights emerge, those that elucidate effectiveness or performance in any specific area of KT, and those that represent institutional cultural differences. Key to use of these ratios is to try to seek benchmarking comparisons that eliminate confounding issues, such as RPO size and tradition, research bias and funding sources.

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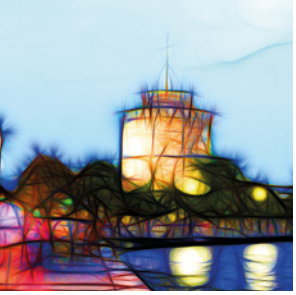

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GENDER SENSITIVE HR POLICIES AND PRACTICES AS A MEANS FOR INCREASING THE COMPETIVENESS OF ICT COMPANIES: A SEE CASE STUDY

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The Information and Communication Technology (ICT) industry is undoubtedly one of the fastest growing industries and represents a labor market where the demand for skilled workers is continually growing and is permanently unsaturated. The ICT sector provides more employment-intensiveness and plays a key role in fostering development. Analysis shows that in the next 10 years the world will face an even more serious shortage of IT personnel. Since the representation of women worldwide in this profession is low (i.e., 20% versus 80% for men), the purpose of our research was to analyze the advantages of a higher presence of women in this industry and to 'break' the myth that technology, especially information technology, is a male profession. Provoked by this and similar findings we conducted a quantitative survey and qualitative research in the region and worldwide, in order to gain conclusions, recommendations and guidelines for future activities aimed at contributing to the increased number of women, higher productivity and engagement, improved services and products and reduced outflow of employees from the companies for software and IT services through the implementation of gender sensitive policies and practices in human resource management. Our research presents examples of positive gender sensitive practices from reputable companies in this industry in the world and the region. Specific additional studies could guide the implementation of gender relevant human resource management practices for software development and IT services in real terms.

Keywords
Equal Opportunities, Gender, Gender Equality, HR Policies and Practices, ICT, Software Development and IT Services

1. Introduction

A number of studies in the European Union (EU) provide relevance towards introducing a gender perspective in the workplace. They provide evidence that investments in gender diversity and a proactive approach in attracting and utilizing female talent and potential is an opportunity for more efficient solving of today's business challenges and for performance improvement.

In order to improve the competitiveness of enterprises, specific tools offer information and practical guidance on how companies can take advantage of overcoming gender stereotypes through optimizing human resources management practices and of the capacity building. If one excludes the gender equality, the answer to why a radical integration of women in the business world is required, both in management and in unconventional jobs, is that it is a matter of business competitiveness.

Based on a quantitative research from 2014 in Macedonian companies for software development and IT services [1], there are fewer women employed (27%) and fewer women in management positions (only 12%) compared to men. To this end the Macedonian Human Resources Association (MHRA) explored the opportunities and mechanisms in ten Macedonian software development and IT services and in seven multinational ICT companies (Orange, Google, IBM, Deutsche Telekom, SAP, Cisco and Symantec) to help understand and overcome the situation related to the lack of skilled personnel in the industry through the application of gender sensitive practices to discover to what extent, and how, companies attract, develop and retain women. This research was funded by the Increasing Market Employability (IME) Program of the Swiss Agency for Development and Cooperation (SDC), implemented by SwissContact and Preda Plus.

The increased interest among women for this industry in the country is visible both through the number of new graduates and through the gradual balancing of the gender structure inside companies themselves. Female employees have shown to be stable, loyal and productive staff. It is suggested that through a proactive approach to female recruitment and adjusting the terms and benefits that companies offer to their employees a strong business case can be made for further development based on international best practice. The research observations suggest that companies, through investing in their greatest potential - the employees, especially women – and through implementing certain examples of positive practices for gender sensitive human resource management policies and practices from reputable companies in this industry, can achieve competitive advantage.

2. Framework of the research

By analysing the existing practices in the world from the literature in the area of human resources management, and based on the experience of the applied practices of human resource management in Macedonian, regional and international companies, areas with potential for application of positive gender sensitive practices have been selected. The processes which cover most of the so-called life cycle of employees in a company have been taken into account. They were divided into separate areas (*shown in the Figure 1*) [1] and for each of them more specific questions, relevant to the subject of interest of this research, were defined. They formed the basis for development of the instruments for data collection.

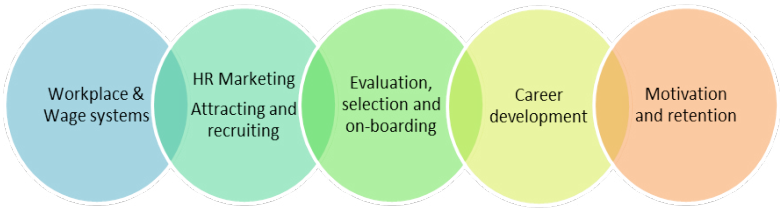

Figure 1 Core Human Resource Management Areas

2.1 General policies and practices

Macedonian companies typically use different internal documents that disclose their policies regarding human resources, such as corporate values and general guidelines concerning the human capital in the company. The world practice shows a tendency to proclaim the anti-discrimination and the affirmative content for promotion of the gender equality and the equal opportunity policies in such documents [2]. These contents clearly articulate the determination of the management on the gender issues; they encourage processes in support of equal opportunities for women and men and have a positive effect on the relations between employees, to all who are interested in employment in the company as well as to the public.

The research has shown that in Macedonian companies the inequality issues between women and men are treated as an absence of direct discrimination [1]. Companies mostly foster a culture of same treatment of both gender representatives and the affirmative approach is considered undue favouritism. Awareness that the equal treatment of unequal is just as discriminatory as the differential treatment of equals is still lacking whether among the responsible persons for human resources management and the management, or among the employees. The companies do not have documents with outlined specific policies and practices, through which in a formal way they would promote the practices for equal opportunities for the employed women and men. In some of the companies which are part of larger multinational corporations headquartered in developed countries, there are contents taken from the corporate documents at the group level, but without a deeper operationalization.

On the other hand, the international practices show that in some companies women represent more than a quarter of the workforce (*Symantec)* [3]. By establishing a corporate culture and corporate guidelines of an equal representation, Symantec is trying to implement these values top down. They went further and changed the whole concept of wording within the company. The practice of changing the organizational culture in the company through simple measures to change the image of the company, can significantly improve the relations between employees and contribute to building a culture of respect and representation based on the diversity of the people. All this in turn leads to improved products and services, but also to self-promotion as a desirable employer who nurtures high moral and social standards with their own employees.

2.2 System of work positions and wages

It should be recognized that skills "do not have gender" and can also be acquired outside the workplace and also during career breaks. Stereotypes and prejudices against the anticipated social roles and abilities of women and men, to a large extent determine the representation and value of labour in certain sectors and professions, opportunities for career advancement, especially in positions that allow influence and control over resources. In the context of the provision of equal opportunities as a competitive advantage, horizontal and vertical gender segregation, i.e. the concentration of men vs. women in different sectors, positions and hierarchical levels, presents an indicator of the circumstances or restrictions which need to be examined and addressed by mitigation measures or removal.

Table 1 Usage of gender-neutral language in Symantec [4]

Traditional Language	Gender-Neutral Language
businessman	businessperson/professional. If you are referring to a speciffic case, businessman or businesswoman is acceptable.
chairman	chair, chairperson. If you are referring to a specific case, chairman or chairwoman is acceptable.
he or she	you, user, customer, client. You can usually use the plural pronoun they or their.
guy/guys or gal/gals	Do not use.
man hours	Use a reference to a specific unit of time.
manpower	employees, staff, personnel, workforce
Mr. $ Mrs. John Smith	John Smith & Jane Smith (or Jane & John Smith), Mr. & Mrs. Smith, Mr. & Ms. Smith
Miss	Ms. (when the martial status of a woman is unknown or irrelevant)
salesman	salesperson. Sales rep or sales representative is also acceptable
spokesman	spokesperson. If you are referring to a specific case, spokesman or spokeswoman is acceptable.

There are still positions that are generally filled mostly with female employees. Traditionally female are the administrative and the financial/accounting positions. This requires a determination of specific measures which shall ensure a balanced gender representation in the company structure, based on clear business generated benefits. According to the forward-looking human resources managers, mixed gender teams have the advantage of possessing better ideas and results [5]. Although the staff in companies consider that working in gender-heterogeneous teams brings results and positive working atmosphere in the team, companies do not implement measures for monitoring the performance of the teams depending on the gender structure and are not able to carry qualified decisions about the need for gender balance in specific positions and teams, in order to achieve better success [6]. For the emergence of horizontal and vertical segregation in positions there is a need to introduce mechanisms for analysing and assessing measures directed to achieving gender balanced environment. Some of these measures can be articulated through the planning of human resources with balanced gender representation at all levels and at all work positions in

companies. Wages must be consistent with the conventions for equal valuation of labour, regardless of gender.

In 2014, the main activities of the French company *Orange,* in the field of gender equality, specifically aimed at supporting women's advancement at responsible management positions, were focused in the following categories [7]:

- Access of women to the responsible positions through a pool of talent and leadership networks,
- Mentorship - in order for women to achieve their maximum potential,
- Participation in internal, external and international networks of women organizations - in order to develop their leadership skills,
- Policy of equal wages, and
- Building a balance between work and private life, through strategic committees, which were in charge of implementing the policy for balanced business and private life, brought from the French Ministry of Women's rights.

For the practical implementation and support, these policies provided *Orange* capacities by setting up a team dedicated to gender equality within the human resources department, which is based on a network of 19 gender equality correspondents designed to promote gender equality at all levels in the company.

2.3 Attracting and recruiting – HR Marketing

HR marketing is one of the areas through which companies can position themselves on the labour market and by promoting their policies and practices, and corporate culture, to gain advantage over other companies in the process of attracting candidates. Companies that would become known as employers who provide equal opportunities for women and men can come to the primary source of competitive advantage - the people. To be competitive, it is crucial to recruit the right people at the start and to be able to keep them. Companies that would adapt to women and would show that they are truly welcome will be able to access the largest source of talent from all sources. In order to achieve this, they should understand that:

- The priorities regarding the work are individually changing at different stages of life,
- The continuous career path as a model is no longer applicable,
- They should broaden the narrow definitions of the career path to the top,
- They need to break down the age barriers for identification and development of people with high potential,
- They should accept the individual approach concerning the work-life balance and
- Performance should be measured by results - not by hours [5].

In Macedonian companies there is a lack of knowledge and understanding of the management and of the employees for the relevance and the potential benefits from a proactive approach in providing equal opportunities for women and men. Hence, companies do not implement strategies and measures which would emphasize their advantages to attract women as a loyal and stable source of potential employees amid a shortage of skilled personnel in the industry and intense fluctuation and taking over of employees among

companies [1]. Furthermore, companies pay very little attention to a strong practice for attracting the desirable staff in number and quality in this industry – the scholarship programs. Investment of companies in cooperation with the higher educational institutions for this profession in this kind of practice, especially when putting a focus on the pupils who graduate from high school, contemplating where to continue their education, can bear excellent, long-term and sustainable results in terms of providing competitive source of quality personnel for the IT industry. A similar effect, but aimed at students who are in process of study, can be achieved with the consequent implementation of gender-balanced internship programs.

On the other side of the World, successful ICT companies have understood the importance of diverse teams, which is shown in the published article of *SOFTWAREGUILD* magazine titled "*Current situation of women in technology*" [8] with a data for 2014, comparing the gender representation in high-tech companies.

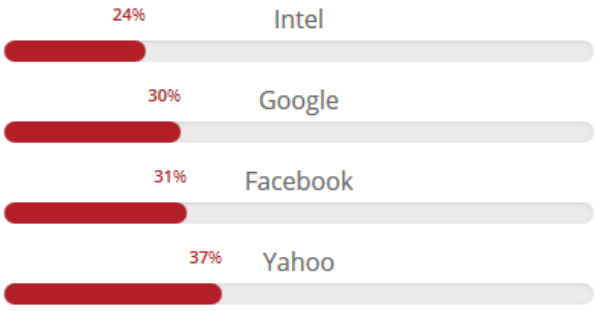

Figure 2 Percent of female employees in high tech companies

According to the graph it can be seen that Google, with 30% representation of women did not differ from global trends on gender representation in ICT companies [9]. TIME magazine, in June 2014 has published information that the next steps at Google will focus on recruiting more women, and that it has already invested 50 million US dollars in high-tech science education of the young girls.

2.4 Evaluation, selection and on-boarding

In the evaluation and selection process, companies have an opportunity to establish procedures and criteria for evaluation and selection of candidates, through which they will provide greater opportunities to a wider range of possible candidates to present their qualifications and skills, but also recognition of their potential, taking into account the possible gender relevant barriers. In this way companies are increasing the possibilities for simultaneous provision of qualified personnel and gender-balanced structure. In some large multinational companies, practices exist for ensuring equality in the participation of men and women in the selection process, such as the mandatory gender balanced representation of candidates in the first and second round of selection.

In assessing the candidates, any discriminatory criteria on the basis of gender are prohibited and companies should strictly observe it. It is desirable the interviews to be carried out by

mixed teams of men and women with different experiences, good interviewing skills and good knowledge of the job requirements. It is particularly valuable to have gender sensitive and trained recruiters [1].

The World ICT giant *IBM,* for instance, sets out specific quantitative goals in order to expand the participation of women in the list of applicants when recruiting or filling vacant managerial position. The ultimate goal is always to choose the best candidate for the job, but if the last two selected candidates are equally competent, preference is given to the female candidate [10].

2.4 Career development

In Macedonian companies it is evident that almost all companies have developed systems for employee development and pay attention to it, which is understandable from the aspect of the industry, as one of the most dynamic and most progressive ones. It is clear that women are increasingly taking up their place in the management structures and are becoming more prominent source of talent [1]. However, it is evident that they do not have mechanisms for identifying possible barriers and clear strategies for more intensive involvement of female employees in the higher hierarchical levels and decision-making positions. Developing and raising the awareness of senior management and people responsible for human resources management, the policy of equal opportunities can significantly contribute to changing the general approach of the companies and to offer solutions that will enhance the advancement of women in the companies to decision making functions.

Positive practices may be noted through which in the case of longer absences of employees, companies nurture the contacts with the staff and maintain their primary speciality or corporate competencies through invitations to specific trainings and joint events. In such cases there is an opportunity to improve relations through additional assistance to companies by supporting related reasons for the absence (e.g., childcare or providing additional conditions in cases of parental leave).

Internationally taken, Deutsche Telekom uses career development programs such as female leadership. The goal was and continues to be, recognition, promotion and support of talented women leaders. They make continuous efforts to recognize women's capacity for leadership roles at all levels in the company [1].

2.5 Motivation and retention of female employees

Taking care of employees is in the spotlight on any company whose competitive advantage and carriers are the employees. The business will prosper and thrive if employees will have an opportunity to strike a balance between work and their personal life. If flexible options for work that fit into their lives and business needs are enabled to employees, it will give the opportunity to companies to feel the benefits of increased productivity and performance. It makes it easier for the employees to realize their responsibilities outside of the workplace. That in turn can help to reduce absenteeism and sick leaves [1].

Companies for software development and IT services are considered to be leading in the country in creating suitable conditions and for offering a selection of numerous features and

benefits for their employees. Flexible and/or part-time jobs and work from home are positive examples that were highlighted to be of great importance to employees. Companies show readiness for application of these modalities, but they are facing lack of appropriate legal regulations. Measurement of performance by the results rather than per hour is recognized in these companies. Practices bond between family and work, and the balance between work and private lives of employees conducted by the IT companies can be positive example for companies from other industries in Macedonia.

Internationally, *IBM* encourages balanced state between work and private life through a Work/Life program, which aims to retain key talent, providing flexible work schedules, the option to work from home, up to three years parental leave, care for children and adults, additional services including consulting and seminars on current topics and issues related to the workplace, such as stress. With the help of this program the percentage of women in management positions, and mothers increased [10].

3. Conclusions

The increased interest among women for this relatively young industry in the country is visible both through the increased output of women from the educational process and for the gradual balancing of the gender structure in the companies, especially those founded at a more recent date, among employees as well as in the management structures.

The long-standing belief that the best way to integrate women is to treat everyone in the same way is now being challenged: companies recognise that a lack of understanding of diversity is too expensive risk to take. The benefits, that the difference between female and male employees can bring, have too often been ignored. It is well known that in business you need to carefully plan and realise investments and then monitor and evaluate the return. Employers who want to capitalise on their investment in human capital will seek to create cultures that value and appreciate gender differences. Valuing differences means recognising that men and women have different social roles and work in different social areas and positions, and therefore have different experiences, values, and perspectives that benefit the business. At the same time, it means to be able to see and value their individual capacities and skills, beyond gender stereotypes.

Continuing the efforts to help the companies from the IT sector, MHRA produced a brochure on case studies of different HR policies and practices from seven ICT multinational companies: Orange, Google, IBM, Deutsche Telekom, SAP, Cisco and Symantec. The impact of such decisions should ultimately result in increased profitability of companies, improved solutions for customers, increased motivation and productivity of employees and reduced turnover by employees.

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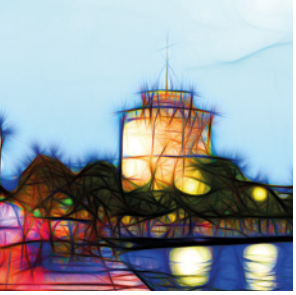

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EVALUATION AND MONITORING OF INCUBATION PROGRAMMES – POLISH AND INTERNATIONAL EXPERIENCES

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Global experiences in building monitoring and evaluation models for incubation programmes are diverse. They cover the creation of methodology, indices and processes, and making them part of the innovation stimulation system. In Poland the situation is completely different. The creation of incubation programmes has been funded almost exclusively from structural funds and only in this context, at the system level, did the notion of evaluation appear. For this reason, the objective of this paper is to point out the specific conditions of incubation programmes implementation around the world and in Poland, and their connection with the issues of monitoring and evaluation as well as to indicate the preliminary assumptions of an evaluation and monitoring model which could be developed for the purposes of national business support institutions.

Keywords
Effectiveness, Evaluation, Incubation Programs, Monitoring

1. Introduction

Incubation programmes have been implemented in Poland for over 20 years. They were created partly (especially directly after the transformation) based on American models and partly (after Poland's accession to the European Union) based on good practice from West European countries. In addition, a significant majority of institutions running incubation programmes until today (incubators, science and technology parks) developed them using funding from structural funds.
Knowing all this, it is simply hard to believe that in today's Poland there is no developed culture of incubation programmes evaluation and monitoring or a standard for measuring the effects achieved thanks to this tool of intervention.

2. Incubation programmes – theoretical perspective

The first incubator was formed at the end of the 1950s in the United States. The increase in popularity of the idea of incubation three decades later gave rise to a number of terms related to it, such as incubator, incubation programme, preincubation, acceleration, whose definitions are not always unambiguous. For instance, the term "business incubator", denoting a whole group of entities running incubation programmes, functions in literature in English. In Polish terminology, however, a distinction is drawn between entrepreneurship incubators and technology incubators, and it is rather the latter which, by reason of their purpose, scope, organisational model and method of funding, correspond to the category of a "business incubator".
Aernoudt [1], in turn, suggests that the term "incubator" should be treated as a collective designation, because it is used to describe a very diverse reality and define institutions whose objectives are completely different. To support his thesis, Aernoudt proposed five types of incubators – mixed, economic development, technology, social and basic research – distinguishing them based on:

- Challenges which they are to address (a deficit in the field of business, in the level of regional development, in entrepreneurship, in social development, in scientific discoveries).
- Objectives which they are to fulfil (creating start-ups and stable jobs, regional development, innovation and technology stimulation, establishing start-ups, starting companies by graduates, forming spin-off companies).
- Sectoral specialisation (the high-tech sector, e.g. IT, biotechnology, non-profit organisations)

On the other hand, an *entrepreneurship incubation programme,* also called incubation, is defined as support activities in the process of socio-economic development, focused on counselling potential beginner entrepreneurs, organising and accelerating their growth by a comprehensive programme of business support. The incubation process involves support for business concept development [2] and is also described as an activity bringing together talents, technologies, capital and know-how. For the activities implemented by business support institutions to be called incubation programmes, they should

- Constitute a comprehensive support programme for beginner entrepreneurs and the process of founding a new company from idea to market stability,
- Focus on counselling young entrepreneurs, in order to reduce the rate of company failure at the initial stage of development and speed up their growth,
- Implement three complementary and consecutive stages: preincubation (support at the stage of polishing up business ideas), incubation (support at the stage of company start-up) and acceleration (support in the process of market facilitation),
- Limit the participation period in an incubation programme [3].

The essence of incubation programmes was also aptly and exhaustively captured in the definition provided in the study by the European Court of Auditors [4], according to which it is an individualized document describing planned events and activities regarding specific new

entrepreneurs admitted to an incubator. It has been indicated that the aim of an incubation programme is to set business objectives for an enterprise and define the scope of channelled resources and services which shall contribute to its development. The fulfilment of the programme and achievement of business objectives should be monitored using indices and evaluated.

3. Evaluation in the programme theory

Evaluation is a broad term and is defined in various ways. Literature describes it in at least three aspects [5], [6], [7], [8]:

- An element of an organisation's management standard
- Studying the influence of a public intervention on socio-economic surroundings
- Administrative activities of a strictly controlling nature.

The aim of evaluation is to formulate conclusions and recommendations to improve on-going or future activities. Evaluation (and monitoring which necessary to conduct evaluation) are inseparably connected with public intervention and the logics of programme theory.
The discussion on evaluation must take place on a few planes and concern a few elements – at least the subject (the one who evaluates), the object (the one which is evaluated) and the criteria according to which evaluation is conducted.
Evaluation is usually conducted by external, independent experts (external evaluation), less frequently by persons involved in the programme implementation (internal evaluation). Monitoring, on the other hand, is conducted by the employees of an institution involved in the programme implementation.
The object of evaluation is an intervention and its effects, and it is conducted using a wide variety of methods and techniques of socio-economic research, used to measure the effects and explain the mechanisms of an intervention. The integral stages of a public intervention evaluation process are designing and structuring the evaluation study, gathering data, analysis and, eventually, the evaluation and reporting phase. At each of the stages, it is crucial to define standards, rules and criteria of evaluation and ensure continuous education of social partners in development.
However, the question that remains is that of the criteria according to which evaluation is conducted. Literature on the subject shows that the following criteria of evaluation have been devised in the practice of evaluation programming and implementation [9], [10], [11], [12]: *relevance* – which determines whether the objectives of a programme undergoing evaluation are consistent with the needs and problems which should be addressed in a given sector or at a regional level; *efficiency* – which describes the relationship between products or results/ outcomes and inputs, and allows to evaluate the "economy" of activities; *utility* – which evaluates the entirety of effects which occurred as a result of the intervention implementation; *sustainability* – which evaluates, for instance, whether the positive effects of a project at the level of its objectives can last after the external funding has finished and *effectiveness* – which evaluates whether the programme objectives defined at the planning stage have been achieved or are being achieved according to the schedule.

To all those elements, which are of key importance to prepare the process of evaluation, the moment when the study is conducted needs to be added. Taking this factor into consideration, one can distinguish four types of evaluation: *ex-ante* (conducted before the programme is implemented, evaluates to what extent the planned intervention suits the needs and is consistent in terms of the planned objectives and methods of their implementation); *mid-term* (carried out in the middle of the intervention implementation, analyses products achieved at this stage, verifies the accuracy of ex-ante assumptions); *ex-post* (conducted after the programme implementation has finished, studies long-term effects of the programme and their permanence); *on-going* (conducted throughout the entire intervention, provides a more in-depth analysis of selected issues, in particular related to intervention management) [13].

4. Measuring the effectiveness of incubation programmes

International experiences indicate two main mechanisms which influenced the creation of model solutions regarding monitoring and evaluation of incubation programmes. The first one describes a situation in which the aid to business support institutions, running incubation programmes, had a systemic character from the moment they had emerged and consisted in the implementation of long-term governmental programmes. The objectives and expectations for those programmes as well as indices, serving to achieve them, were set at the beginning. As a result, all institutions which received the support had an obligation to use a standard imposed from above in the evaluation of their activities. The second mechanism existed in the case of an organic, grass-roots development of an organisation when incubators created monitoring and evaluation systems for their needs, based on their original assumptions.
Monitoring the effects of incubators' activities is not a key area of their management activities, neither in Poland, nor in all of the European institutions. This is the image which emerges from the 2014 report of the European Court of Auditors. The Court analysed the effectiveness of using the resources from the European Regional Development Fund earmarked in the years 2004-2006 for the development of incubators (27 incubators from 4 member states, Poland, the Czech Republic, Great Britain and Spain, were analysed). Conclusions from the analysis showed that merely a little more than half of the surveyed institutions "had put in place a system whereby incubation activities were regularly observed and recorded. The collection of data in the remaining incubators was limited to the mandatory statistics required by accounting rules and tax regulations" [4]. Moreover, the report said that the incubators often did not collect financial data on the value of aid provided to particular clients and did not include the data on clients' activities in the monitoring of the incubator's activities. "Some incubators did not collect basic performance data because they had only a limited amount of oversight over their clients' development. Only 5 out of 27 incubators used their clients' performance data to improve the management of their facility" [4].
The situation in Polish incubators is similar. According to the data of the Polish Business and Innovation Centers Association (PBICA), in mid-2014, 23 technology incubators were identified which is over 20% less than in the previous study conducted in mid-2012 [14]. As institutions, they form a very heterogeneous group – they have different legal forms (e.g. company, foundation), are established and run by different institutions and have different

owners (e.g. city or municipality authorities, a higher education institution). Therefore, it is difficult to point out common elements of the problem which they are to counteract or objectives which they were established to fulfil.
In Poland, despite the existence of innovative policy, the systemic support for institutions, not only from the central, but also regional level, consisted predominantly, if not exclusively, in providing funding from the structural funds for the creation of infrastructure. Thus, in practice, monitoring and evaluation were limited to reporting on the indices and results of projects which ensured support for the creation of the institutions' infrastructure. Therefore, it comes as no surprise that the PBICA Report [15] has shown that only 33% of Polish incubators surveyed in mid-2014 monitored the activities of their clients; more frequently they monitored the number of services provided, but it usually resulted from the fact that the service provision was funded from projects which entailed reporting. The 2012 Report of the PARP [16], on the other hand, shows that "over 50% of incubators studied declares that they monitor and evaluate their activity chiefly in order to provide an on-going analysis of how effective their activities are and to further improve their offer". The report indicated that the most frequently analysed areas included those related to the organisation of the incubator's operation, the quality of provided services and client needs.

5. Selected world's best practices

5.1 EU|BIC Quality Mark

EU|BIC quality mark is a systemic solution which confirms that an institution complies with the standard for operation for institutions supporting entrepreneurship development. The standard is based on the evaluation of five areas of an institution's functioning. Apart from verifying its mission, the way its operations are organised and the scope and method of service provision, the method of monitoring and evaluating the incubator's functioning as well as how the quality of its functioning is tested are subject to analysis. The process of granting the EU|BIC quality mark consists of three stages:

- Completing a self-evaluation form (the documentation is available on the website http://ebn.be/eu-bic-official-documentation. Detailed documents, including the self-evaluation form, are available only to those organisations which declared willingness to participate in the network)
- Evaluation conducted by EBN experts
- Decision by the EU|BIC Quality Mark Committee (BQMC).

The certificate is subject to annual renewal. It is done by completing a self-evaluation form based on which the BQMC decides to prolong the quality mark. In addition, around 10% of the certified institutions is subject to an "on the spot" evaluation performed by EBN experts. Since 2002, the process of BICs' (i.e. "business and innovation centres") verification has been conducted by EBN (http://ebn.be), pursuant to a contract with the European Commission, and at the moment the certificate has been awarded to around 150 organisations in Europe and around the world.

5.2 Self-Evaluation Workbook for Business Incubators

The quality standard for incubators' operation devised by an US association International Business Incubation Association (InBIA – www.nbia.org) is an example of another perspective, different from the European, on assessment based on self-evaluation. InBIA developed a handbook for incubators' self-evaluation of their operations, which is a tool in a paper form to evaluate the effectiveness of activities of those institutions.
The handbook "Self-Evaluation Workbook for Business Incubators" [17] was divided into 12 areas (chapters), dealing with such issues as mission and strategic planning, management, stakeholders, the incubator's team, incubator's finance, method of choosing clients, services for clients, ending the cooperation with an incubator, marketing and PR, real property management, documenting the incubator's operations and measuring its effectiveness. Such activities as regular collection of information and data necessary for the evaluation and improvement, Key Performance Indicators (concerning the incubator itself, the incubated companies and former tenants) and monitoring the level of their achievement, developing a model of data management and its dissemination are taken into consideration as regards measuring the effects of operation.
The structure of the chapters helps the evaluator as it includes an introduction, tips on how to prepare to evaluation in a given area (e.g. what documents the evaluator should look at before the self-evaluation in a given area, what statistical data he/she should prepare), evaluation criteria, advice and an improvement introduction form (what needs to be improved, the strategy for change implementation, the person responsible, deadline). Once the evaluation all of the abovementioned areas has been completed, the evaluation is summed up in a separate sheet. The authors suggest that the self-evaluation should be done regularly, not less frequently than once a year. It can be conducted by an incubator's manager on his/her own, but the authors suggest that the centre's whole team should be involved in it.

6. Preliminary assumptions of an evaluation and monitoring model for incubation programmes in Poland

In Poland, despite the existence of innovative policy, the systemic support for institutions was related predominantly, if not exclusively, to programmes funded from the structural funds. The only kind of evaluation which took place was connected with the performance of the project indices and results which ensured support for the creation of the institution's infrastructure. Unfortunately, centres carrying out incubation programmes are required on a short-term basis (predominantly, during the ex-post evaluation of operational programmes) to report on indices which were not part of their assumptions on preparing the programmes. Taking the above arguments into account, it would be difficult to call it a planned public intervention in incubation programmes. No systemic frameworks were created, no uniform and consistent objectives were set for the institutions implementing incubation programmes. As a consequence, it was unknown what kind of change was expected and what should undergo the potential evaluation.
If one wanted to start a discussion on evaluation and monitoring of incubation programmes in Poland, all of the elements described above would have to be defined and clarified – it should

be proposed who is to be responsible for the evaluation process, what scope should it have and which indices should be gathered during monitoring and which evaluation criteria should only be taken into consideration during analysis. In order to devise a model evaluation and monitoring for incubation programmes, it should also be decided which types of evaluation to conduct. Furthermore, drawing inspiration from the work of Phana, Siegelb and Wright [18] and adding to Aernoudt's [19] approach, it could be proposed to analyse the operations of business support institutions (especially technology parks and incubators) on three plains:

- business support institutions as organisations,
- enterprises which are the tenants of those institutions,
- entrepreneurs and teams working in the tenant companies.

At present, there is no standard for monitoring and evaluation of incubation programmes in Poland. The first attempt to introduce a Poland-wide standard for the management of business support institutions was the development and implementation of the community standard by the SOOIPP. To a certain extent, it refers to the solution implemented by EBN. However, due to its nature, it does not focus on evaluation.

A way out from this situation which, on the one hand, offers certain organisational comfort to business support institutions, and, on the other, reaches towards the expectations of public administration, is to draw up a proposal of a standard for evaluation and monitoring of incubation programmes. The proposed model should be based on the existing national and international good practice, be verified by business support institutions which could point out useful questions necessary from their point of view, and then, after iteration, receive its final form.

The evaluation of incubation programmes should be conducted throughout the entire lifetime of the intervention – at the planning stage (ex-ante), during its implementation (on-going) and after it is finished (ex-post). Only such approach will make it possible to ensure the maximum effectiveness of incubation programmes.

To recapitulate, while evaluating an incubation programme, a number of indices needs to be applied which will make it possible to evaluate its stage of development, character of activities performed, the method of conducting operations and effectiveness of fulfilling the set objectives. The creation of a cohesive system for the incubation programme evaluation and monitoring, consistent with the incubator's strategy, is a necessary precondition for the analysis of the institution's results and its continuous improvement as well as the comparison of the institution with similar entities.

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Index

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Index

Index

Index

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