UDC 334.72.012.63/.64:001.895]:303.6(497.7)
Original scientific paper

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BARRIERS OF IMPLEMENTING OPEN INNOVATIONS IN MACEDONIAN SMEs

Abstract

Open innovation is a concept of growing acceptance in the field of innovation management. It is based on the idea that companies can leverage the knowledge generated externally to improve their innovation performance. Shorter innovation cycles, the rising costs of industrial research and development, and a lack of resources have motivated many organizations to change their innovation strategies towards implementing open innovations. However managing open innovation process in SMEs is more difficult and complex than it is the case with large enterprises. The reasons behind the low integration of the open innovations in SMEs generally can be found in their limited organizational, financial and human resources. By conducting a survey among 63 SMEs in Republic of Macedonia, current open innovation practices and barriers are searched. Findings revealed that the low capacity of the SMEs to deal with the open innovation process, low awareness of the benefits of the open innovation process, and lack of knowledge on protection of intellectual property rights are concluded as the main constraints in adapting open innovation practices.

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Keywords: open innovation, SME, open innovation process, open innovation barriers, open innovation awareness

JEL Classification: **O31**

Introduction

The open innovation is a concept of growing acceptance in the field of innovation management. It is based on the idea that companies can leverage the knowledge generated externally to improve their innovation performance. Open innovation is based on the traditional innovation process which represents a crucial aspect of promoting the growth and development of SMEs. But establishing a system for implementing the process of innovation, which is time consuming and very complex process, is usually a great financial burden for the SMEs, and providing long-term finance for innovation would have a devastating effect on them.[4] Therefore, new ways of innovation must be looked for, in which open innovation represents a viable alternative for companies. Shorter innovation cycles, the rising costs of industrial research and development, and a lack of resources have motivated many organizations to change their innovation strategies towards implementing open innovations.[5]Open innovation is defined as "the purposive use of inflows and outflows of knowledge to, respectively, accelerate internal innovation, and expand the markets for external use of innovation process".[6] Open innovation can be a part of any of the four different types of innovation: 1) innovation in process of production, 2) innovations in business model, 3) innovations in product and 4) innovation in organization. All of these types of innovations can be made easer through the concept of open innovation, by creating a mutual trust between the SMEs and their innovation partners and joining their resources in creating innovations.

[4]Zimmermann Volker, (2014).KfW SME Panel 2013: How German SMEs finance their innovations, KFW Economic Research, p. 1.

[5]Gassmann Oliver and Enkel Ellen (2004), Towards a Theory of Open Innovation: Three Core Process Archetypes, Institute of Technology Management, University of St. Gallen, Switzerland, p. 2

[6]Chesbrough Henry (2006), "*Open Innovation: The New Imperative for creating and Profiting from Technology*", Harvard Business School Press, United States, p. 2.

The SME sector in Macedonia is very important for the economy. According to the State Statistical Office data,[7] the number of active business entities in the Republic of Macedonia in 2014 was 70,659 and SMEs represent 99.7 percent of them. They engaged about 76.7 percent of total number of employees and created 65.6 percent of the value added.[8]

According to the Innovation Union Scoreboard 2014, Republic of Macedonia is a modest innovator ranking 31st out of 35 countries with *Summary Innovation Index* of 0.2458 much below 0.5539 which is the EU average. The situation with SMEs' innovation is even worse. Macedonia is ranked 31st based on *SMEs innovating in-house* indicator (0.0155), and 19th regarding *Innovative SMEs collaborating with others* indicator (0.3590) which gives some perception on open innovation adoption by the SMEs in Republic of Macedonia. Regarding innovation outputs, *SMEs introducing products or process innovations* indicator is 0.5938 (ranked 15th) and *SMEs introducing marketing/organizational innovations* indicator is 0.3615 (ranked 24th).[9] So, the open innovation is still a relatively new process in Republic of Macedonia with only small portion of enterprises actually practicing it.[10] The reasons behind the low commitment to the innovation in general can be seen in the lack of innovation network, limited funding opportunities and lack of venture capital, and very small percentage of GDP devoted to research and development[11]. Larger enterprises can allocate much more assets into the research and development program; on the other hand, SMEs rely on their new ideas, knowledge of consumers and commitment to innovation, which all together increase their chances for market success. But, the lack of information and data concerning the process of open innovation is one of the possible reasons for low level of awareness for the process of open

[7]State Statistical Office of Republic of Macedonia. 2015a. Number of active business entities, 2014. News Release No: 6.1.15.14. Available at: http://www.stat.gov.mk/pdf/2015/6.1.15.14.pdf [Accessed 18 May 2015]

[8]State Statistical Office of the Republic of Macedonia. 2015b. MAKStat Database. Available at http://makstat.stat.gov.mk/pxweb2007bazi/Dialog/Saveshow.asp [Accessed 18 May 2015].

[9]European Commission (2014), Innovation Union Scoreboard 2014. European Commission, Brussels

[10]Josimovski Sasho (2011), "Thematic Report 2011 under Specific Contract for the Integration of INNO Policy Trend Chart with ERAWATCH", Pro Inno Europe, pp. 9-12.

[11]Ibid, pp. 13-15.

innovation amongst the Macedonian SMEs.[12]Also, the lack of networking structure at national and regional level on tackling open innovation issues can be foreseen as one of the crucial problems for implementation of open innovation process particularly in SMEs.

This paper concerns level of awareness and constraints for adoption of open innovation strategies in SMEs in Republic of Macedonia. The constrains have been categorized referring to the four open innovation aspects: human constrains, general constrains, policy constrains, and constrains that have evolved due to the rise of global competition[13]

1. Theoretical review

Open innovation is a distributed process of innovation based on purposively managed knowledge flows across organizational boundaries, using pecuniary and non-pecuniary mechanisms in line with each organization's business model.[14]This means knowledge inflows to the focal organization (leveraging external knowledge sources through internal processes), knowledge outflows from a focal organization (leveraging internal knowledge through external commercialization processes) or both (coupling external knowledge sources and commercialization activities).[15] The traditional (closed) innovation system has some serious shortcomings and there is an urgent need of establishing a contemporary innovation system – an open innovation system. The contrasting principles of closed and open innovation include:[16]

[12]Ibid.

[13]Rahman Hakikur and Ramos Isabel (2013), "*Challenges in Adopting Open Innovation Strategies in SMEs: An Exploratory Study in Portugal*", Issues in Informing Science and Information Technology, Volume 10, p. 435.

[14]Chesbrough Henry and Bogers Marcel (2014), "Explicating Open Innovation:Clarifying an Emerging Paradigm for Understanding Innovation" in *New Frontiers in Open Innovation*, eds.Chesbrough H., Vanhaverbeke W., and West J., ISPIM, Dublin, pp. 3-28.

[15]Ibid.

[16]Chesbrough Henry (2006), "Open Innovation: The New Imperative for creating and Profiting from Technology", Harvard Business School Press, United States, p. 2.

Closed Innovation principles	**Open Innovation principles**
• The smart people in the field work for us.	• Not all the smart people in the field work for us. We need to work with smart people inside and outside the company.
• To profit from R&D and Innovation, we must discover it, develop it, and ship it ourselves.	• External R&D and Innovation can create significant value: internal R&D and Innovation is needed to claim some portion of that value.
• If we discover it ourselves, we will get it to the market first.	• We don't have to originate the research to profit from it.
• The company that gets an innovation to the market first will win.	• Building a better business model is better than getting to the market first.
• If we create the most and the best ideas in the industry,	• If we make the best use of internal and external ideas, we will win.
• We should control our IP, so that our competitors don't profit from our ideas	• We should profit from others' use of our IP, and we should buy others' IP whenever it advances our business model.

There are two important kinds of open innovation: outside-in and inside-out. The outside-in part of open innovation involves opening up a company's innovation processes to many kinds of external inputs and contributions. Inside-out open innovation requires organizations to allow unused and underutilized ideas to go outside the organization for others to use in their businesses and business models.[17] In contrast to the outside-in branch, this portion of the model is less explored and hence less well understood, both in academic research and also in industry practice. In order to further improve the scientific capabilities and

[17]Chesbrough Henry (2015), "*From Open Science to Open Innovation*", Institute for Innovation and Knowledge Management, ESADE, Science Business Publishing, p. 2.

commercialize the research output from projects such as the LHC,[18] new businesses and business models must be identified, explored, and undertaken.[19]

In addition to being beneficial for large "firms as well as for small and medium-sized enterprises (SMEs),[20] SMEs can open their own innovation processes to implement internal ideas otherwise unexplored, to ensure access to external ideas, to enable better utilization of their partially hidden innovation potential, to share the wealth and efficiency in resource allocation(e.g. per unit cost accounting basis),to extend their potential for growth via alliances and or attraction of funding, to be offered ample opportunities by larger companies to access resources/knowledge otherwise far too expensive for them.[21]

The Government of Republic of Macedonia has implemented several strategies regarding innovation, wherein we can recognize certain elements of open innovation; however, this field is not fully regulated and there is no significant practical implementation of open innovation.

2. Empirical research

The research aims to acquire knowledge about open innovation adoption by SMEs in Republic of Macedonia. The focus is to identify SMEs characteristics especially related to their innovation activities in general, and in open innovation process in particular. **The main goal is to identify Macedonian open innovation trends and practices and identify obstacles constraints for open innovation adoption**. Several specific objectives of this research are:

[18]See Boisot, Nordberg,Yami and Incquevert, Collsionsand Collaborations: The Organization of Learning in the Atlas Experiment at the LHC, (Oxford University Press: 2011) for one detailed description of the institutions governing the science at CERN.

[19]Chesbrough Henry (2015), "*From Open Science to Open Innovation*", Institute for Innovation and Knowledge Management, ESADE, Science Business Publishing.

[20]Chesbrough Henry (2006), "Open Innovation: The New Imperative for creating and Profiting from Technology", Harvard Business School Press, United States, p. 2.

[21]Open Innovation Benefits For SMEs, - project funded by the European Collaborative and Open Regional Innovation Strategies – EURIS, The Interregional Cooperation Program INTERREG IVC and Co-financed by ERDF under INTERREG IVC program of the European Union.

- To assess the level of open innovation awareness amongst Macedonian SMEs
- To assess the open innovation adoption by SMEs
- To identify the key actors involved in open innovation process in Macedonia
- To recommend measures to improve open innovation adoption rate by SMEs

The survey was conducted using a questionnaire as a research tool for data collection. The questionnaire was developed and placed online using the Google Drive and communication via emails with a request to fill in the questionnaire were sent to 63 SMEs. Responses were received from 36 respondents, representing 57 percent response rate which is much higher than the average response rate of 35.7 percent for studies that utilized data collected from organizations.[22] Still, the margin of error for this sample size is 16.7 percent, so the survey results are not representative, but only indicative and will use as a pilot for tuning the final design of full research that will be carried out in the next phase.

Respondent sample is consisted of 21 micro,14 small and 1 medium enterprises belonging to the industries represented at the Table 1.

Table 1 – SME survey sample by sector

Sector	
Information and communication	33.3%
Wholesale and retail trade; repair of motor vehicles and motorcycles	30.6%
Manufacturing	25.0%
Accommodation and food service activities	8.3%
Electricity, gas, steam and air conditioning supply	2.8%
Grand Total	100.0%

Source: *Authors' research*

Almost one fifth of all enterprises (19.4 percent) do not have innovation budget at all, and 44.4 percent spent only 0-1 percent from their income on innovation activities (Table 2).

[22]Baruch, Yehuda &Holtom C. Brooks (2008), "*Survey response rate levels and trends in organizational research*", Human Relations vol. 61 no. 8, pp. 1139-1160.

Table 2 – Percentage of income spent on innovation activities

Percent from income spend on innovation	Percentage of enterprises
0	19.4%
0-1%	44.4%
1-2%	8.3%
2-4%	25.0%
15%+	2.8%
Grand Total	**100.0%**

Source: *Authors' research*

SMEs in Macedonia do not pay much attention on innovation activities. The results also show that 72.3 percent of all enterprises do not have employees dedicated to any innovation activities (16.7%) or only 0-3 percent of the employees are part of some innovation activities in the company (55.6%)(Table 3).

Table 3 - Employees dedicated to innovation activities

Percent from all employees dedicated to innovation	Percentage of enterprises
0	16.7%
0-3%	55.6%
3-6%	11.1%
6-10%	2.8%
15-20%	8.3%
30%+	5.6%
Grand Total	**100.0%**

Source: *Authors'research*

The results shows that 83.3 percent of all SMEs have not heard about the concept of Open Innovation, and 94.4 percent have no knowledge about Open Innovation concept at all. Despite the low awareness amongst Macedonian SMEs, 54.5 percent of all SMEs have cooperated with other companies or organizations in any of their innovation activities, so the SME are not aware of, but still they use the Open Innovation concept.

Table 4 - Main innovation partners of Macedonian SMEs

Type of Innovation Partner	Mean	n	Response rate
Suppliers of equipment, materials, components or software	7.50	21	38.2%
Clients or customers from the private sector		9	16.4%
Government, public or private research institutes		8	14.5%
Universitites or other higher education institutes		7	12.7%
Clients or customers from the public sector		5	9.1%
Competitors or other enterprises in the sector		5	9.1%
Consultants or commercial labs institutes		0	0.0%

Source: *Authors'research*

Table 4 illustrates the type of innovation partners of the SMEs. According to the results the most common partners into their innovation activities are their suppliers (38.2 percent) and clients from the private sector (16.4 percent). The most unlikely partners of the SMEs in innovation activities are the clients from the public sector, competitors and consultants or commercial labs.

Table 5 - Open Innovation Concept per type of Innovation

Purpose of use Open Innovation		n	Response rate
Product Innovation	Yes	28	84.8%
	No	5	15.2%
Process Innovation	Yes	15	83.3%
	No	3	16.7%
Business Model Innovation	Yes	21	80.8%
	No	5	19.2%
Organization Innovation	Yes	20	87.0%
	No	3	13.0%

Source: *Authors'research*

Table 5 shows the percentage of SMEs that intent to use or are already using the concept of Open Innovation for different type of innovation activities. According to the results, all four types of

innovation activities are appropriate to be implemented with the Open Innovation concept.

The research shows that 80.6 percent of the SMEs have dedicated no part of their innovation budget for Open Innovation activities, have no dedicated employees for open innovation and also have no product developed in the last three years which is based on the open innovation principles. 19.4 percent of all respondents spent 0-5 percent of their innovation budget on open innovation activities, resulting in 0-10 percent of their new products developed implementing open innovation concept.

According to the answers provided by the SMEs presented on Table 6, the key constraints regarding Human Resources are the scarcity of skilled employees in their companies (93.3 percent) and the high level of the wages which is burden for their financial condition (36.7 percent). The Key general constraints are the lack of knowledge to implement new technology (54.5 percent) and the lack of skilled workers on the Macedonian labor market (51.5 percent). In an era of globalization and enormous influence that Internet technologies have on people's private and professional life, the competitiveness constraints to adoption of the open innovation competition constraints, or activities that should be undertaken to compensate the barriers related to competition. The first one is to increase the quality of the products/services (72.7 percent) and to increase the marketing activities (66.7 percent). The last aspects of the constraints for implementing Open innovation in SMEs are the so called policy constraints.

Table 6 – Key constraints in implementing Open Innovation in SMEs

Key Constraints	n	Response rate
Recruiting Constraints		
Scarcity of skilled employees	28	93.3%
Wages of the skilled employees are too high, it is a great burden for us	11	36.7%
General Constraints		
Lack of knowledge in implementing new technology	18	54.5%
The labor market lacks skilled workers	17	51.5%
Competition Constraints		
Increase quality of product/service	24	72.7%
Increase marketing activity	22	66.7%
Policy Constraints		
Government policies, laws and regulations	19	73.1%
Unfavorable business climate	17	65.4%

Source: *Authors'research*

The last aspects of the constraints for implementing Open innovation in SMEs are the so called policy constraints. Macedonian SMEs have identified the following two key constraints: 1) problems with the government policies, laws and regulations that are not in favor of the open innovation concept, and 2) the unfavorable business climate presence in the country.

From all aspects of problems identified by the Macedonian SMEs with the adoption and implementation of the Open Innovation concept in their innovation activities the ultimate key constraint is the problem with the lack of skilled employees involved in the business.

Results presented on Table 7shows that according to the SMEs themselves three main factors important for successful implementation and practice of Open Innovation concept in SMEs are: Support by the top management, Collaborators' training on Open Innovation and Allocation of enough resources (including employees, time and budget) dedicated to Open Innovation.

Table 7 - Factors affecting success of implementing Open Innovation concept in SMEs

Open Innovation Success Factors for SMEs	n	Response rate
Support by the top management	19	57.6%
Collaborators' training for Open Innovation	18	54.5%
Allocate enough ressources (employees, time and budget)	14	42.4%
Managing an idea generation process (selection and prioritization of the ideas)	11	33.3%
Managing the intellectual property (protection and valorization)	11	33.3%
Ability to measure Open Innovation success in Enterprises	9	27.2%
To have a corporate culture that promotes idea-sharing	7	21.2%
Support by the middle management	3	9.1%
Existence of systematic and organized approach for acceptance of external ideas	3	9.1%
Proper selection and encouraging of partnerships	3	9.1%

Source*: Authors'research*

Conclusion

SMEs on their innovation path can follow two possible approaches. The first one is to perform the innovation activities fully in-house (so called close innovation), but for small firms this is a big challenge because they typically struggle with lack of financial resources, scant opportunities to recruit specialized workers, poor understanding of advanced technology, and so on. The second approach is to adopt an innovation model to use ideas and knowledge from outside the firm's boundaries, so called open innovation concept.

The awareness of Macedonian SMEs on Open Innovation is not satisfactory. It is evident from the research results that in general they do not pay proper attention on innovation activities (both closed and open), but the fact that they do not have even idea and information on good SMEs open innovation practices and strategies should raise a 'red flag' among all innovation stakeholders in the country.

The research finds that the two main constraints for the low level of open innovation adoption rate by the SMEs are the problem related to

the scarcity of skilled employees and the problem with the government policies, laws and regulations that are not supportive to the open innovation paradigm.

Despite overcoming both key constraints depend more on innovation policy makers, the SMEs themselves could make some actions to improve as well. The research suggests that the most obvious measures are to build a strong commitment and support for open innovation concept by the SME's top management (in most cases the owners of the firms), and to take joint activities with firm's collaborators and partners with focus on promotion and training on Open Innovation concept.

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