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User Adoption Analysis of the E-Government Services in the Republic of Macedonia with Technology Acceptance Model (TAM)

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Abstract
Higher utilization of e-Government services has multiple impact on wellbeing of citizens and businesses. The aim of the research is to identify factors that influence the level of adoption of e-Government services in the Republic of Macedonia. Using Technology Acceptance Model several constructs are defined (perceived ease of use, perceived usefulness, perceived trust, user's satisfaction, social influence, facilitating conditions and demographic factors) that can influence user adoption of e-Government services. TAM is useful in analysis of e-Government adoption because it can be extended by applying domain-specific constructs. Relationships between constructs proved to be significant after analysis of the survey results. Adoption of electronic public services is influenced by the level of trust the users have in conducting transactions with the government. User satisfaction is influenced strongly by the usability and usefulness of the electronic public services that has direct impact of the adoption of e-Government services. Determining the significance of the factors can help policy makers to react in specific directions in order to improve utilization of e-Government in the country.

Keywords: e-Government, Electronic Public Services, e-Government adoption, Technology Acceptance Model, Republic of Macedonia

1 Introduction

E-Government is term that is differently defined by the authors that have research focus in this area. International organizations propose definitions starting from different viewpoints

and stressing certain aspects and ideas about what is e-Government. E-Government can be defined as widespread use of information and communication technologies (ICTs) in public administration. E-Government is the term that reflects the use of information and communication technologies (ICTs) in public administration to change structures and processes of government organisations (Löfstedt, 2005). In fact, e-Government is radical process of reformation of the public administration. Digitalization in the context of public administration is known under the term e-Government and it emerged in the late 1990s, but the history of computing in government can be traced back to the beginnings of computer history. For example, Fountain's definition: "… a government that is organized increasingly in terms of virtual agencies, cross agency and public–private networks whose structure and capacity depends on the internet and web" (Fountain calls this phenomenon "Digital Government" or "Virtual State") is still applicable (Fountain, 2001). E-Government defines an area, the public sector, as well as the institutions, people, and processes which operate within this area and e-Government can be defined as special case of ICT-enabled business process change (Scholl, 2003). More radically, e-Government can be seen as an ultimate innovation because it redefines and improves transaction processing via an IT platform (Estevez, Joseph, 2008). At the offset of the first wave of e-Government, there are similarities in the definitions mentioning three goals: more efficient government, better services to citizens, and improved democratic processes (Grönlund, 2002). Nowadays, technological standards such as openness, usability, customization and transparency for public portals and interoperability between systems in agencies on different levels are a must for the implementation of e- Government projects and are reflected in the definitions. Obviously, it is not only about services or technology; it is about reinventing the way in which governments interact with citizens, governmental agencies, businesses, employees, and other stakeholders (Löfstedt, 2005). The most important goal of e-Government is the delivery of faster and cheaper public services to citizens, business partners, employees, other agencies, and government agencies (Layne, Lee, 2001). E-Government is about change and on the last instance e-Government becomes government. One of the reasons why e-government is being adopted, is to strengthen transparency and accountability and to change the passive role that citizens as 'customers/clients' had (Dimitriu, 2008). The common idea in these definitions is that e-Government involves the automation or computerization of existing paper-based procedures, new styles of management, new ways of debating and deciding strategies, new ways of listening to citizens and communities, and new ways of organizing and delivering public services and information.

E-Services (electronic public services- EPS) have to be designed and implemented to meet the complex and evolving service needs of citizens and other clients (businesses). Latest research is focused on providing for more efficient and user focused methods for delivering e-Services. Thus, user awareness of these services, their willingness to use them, and ease of use all are important factors for the further development of e-Government (CEC, 2003). Success in delivering electronic services depends upon the capability and self-confidence of citizens in performing electronic transactions, as well as their trust and confidence in the protection of

their personal data within an open and accountable government. The research goal of this paper is to examine the influence of different factors on adoption of electronic public services in the Republic of Macedonia.

2 Literature Review – Selected Theories of Adoption of Technologies

Theories of adoption of new technologies are in fact explanations of the factors influencing the decision making over adoption and usage of new technologies and therefore they are relevant to analyse the adoption of electronic public services. In the literature of innovative technology adoption there are many approaches that are elaborated and several are widely used by the researchers. Philosophy of Technology as a concept can contribute to the area of e-Government adoption on a very abstract level (Surry, Farquhar, 1997). Davis's technology acceptance model (TAM) is one of the most influential approaches to explain and predict user acceptance of information systems (Davis, 1989). TAM model is based on the Theory of Reasoned Action (TRA) and to some point on the Theory of Planned Behavior as an extension of the TRA proposed by Ajzen (Fishbein, Ajzen, 1980). According to the TRA behavioral intention that leads to actual behavior is determined by belief or information about the likelihood that particular behavior will lead to certain aspired outcome. The behavior is influenced by the (i) personal attitude towards the behavior and (ii) the subjective norm towards the behavior. In the TBC another factor is included as variable that is affecting both behavioral intention and behavior - perceived behavioral control. Namely, the more resources and opportunities individuals think they possess, the greater should be their perceived behavioral control over the behavior. Perceived behavioral control is included as variable that has direct effect on behavior and indirect on behavior through intention by motivational implications for behavioral intention (Madden et all, 1992). The Technology Acceptance Model (TAM) is widely used for explaining the acceptance of information technologies. Four of the most important concepts that have been constantly used in the TAM literature are perceived ease of use, perceived usefulness, behavioural intention and actual usage behaviour. The perceived usefulness of a technology increases with perceived ease of use. The more ease of use a user thinks a new technology is, the stronger his or her intention to use the technology; furthermore, the stronger the usage intention, the greater the actual usage behaviour. TAM model is more specialized model than TRA and TBC because it focuses on acceptance of information technologies in organizations and by persons. TAM model is not a general model; and it is designed to be applied only to computer usage behavior (Davis, 1989). Therefore, the application of TAM model is appropriate for research purposes while studying acceptance of electronic public services.

Unified Theory of Acceptance and Use of Technology (UTAUT) is formulated in order to incorporate different approaches (or theories) and to construct unified theory (Venaktesh et all, 2003). In order to leverage the full potential of ICT, the technology has to be used in practice, in everyday operations. The role of this model is to fully understand the usage as dependent variable. UTAUT is appropriate model especially in organizations that are in the process of introducing new IT and their employees are attending training of some sort, investigating both mandatory and voluntary use. Under the UTAUT seven variables are perceived as significant for behavioral intention (performance expectancy, effort expectancy, social influence, gender, age, experience, voluntariness of use) and one variable that is directly influencing the use behavior - facilitating conditions. As the authors of UTAUT

mentioned, the methodology is primarily focused to investigate the acceptance in organizational context. The extension of UTAUT is UTAUT2 (Venaktesh, Tong, Xu, 2012). In UTAUT2 the theory is tested from consumer viewpoint, focused on consumer technologies. Three new constructs are presented such as hedonic motivation, costs (price value), and the most interesting one, habit. Hedonic motivation is defined as the fun or pleasure derived from using a technology, and it has been shown to play an important role in determining technology acceptance and use. The cost and pricing structure have a significant impact on consumers' technology use because consumers usually bear the monetary cost (whereas employees do not) and price value is consumers' cognitive trade-off between the perceived benefits of the applications and the monetary cost for using them. Habit is a perceptual construct that reflects the results of prior experiences. Gender, age, and experience have a joint impact on the link between facilitating conditions and intention. From the aspect of e-Government use, definitely UTAUT2 can be applied as there are elements of hedonism, value and habit. As pretext, the previously mentioned theories can serve to explore the adoption of electronic public services.

3 E-Government in the Republic of Macedonia

The Government of the Republic of Macedonia has been making significant attempts to develop a proper framework for implementation of e-public services and the development of e-Government. During the past decade important steps were made in setting and developing of the national e-Government infrastructure.

The beginnings of the implementation and development of the e-Government concept and creation of e-Government applications in the Republic of Macedonia was guided mainly by the legislation, strategies, directives and recommendations imposed by the European Union. These laws, which came in force in the Treaty of Lisbon, besides for all governments of the Member states, also include the countries which are accessing the European Union. In this sense, Republic of Macedonia guided by its aspiration to become EU member state, starting from 2001 paves the way of modern e-society with the first formal document on a national level i.e. the initiative "e-Macedonia for all" by the President of the Republic of Macedonia. In 2002, the Parliament adopted the e-Declaration by which the institutional base was formed for further development of the information society. The institutional framework was set by the creation of the Commission for information technology, later developed into Ministry of Information society and today Ministry of information society and administration. In 2005, a National strategy for development of the information society and action plan was created and E-Government was defined among the seven pillars in this strategy. The first National Strategy for e-Government was set for the period of 2010-2012. It incorporates the vision, goals and potential benefits associated with e-Government. Following the EU guidelines, it identifies the main stakeholders, the priorities and the measures needed to accelerate e-Government development. This strategic document views e-Government as having a much more important role than just supporting the operation of the public administration. The e-Government is recognized as a major factor for achieving sustainable development for the Republic of Macedonia and its society as a whole. The current e-Government strategy of the Republic of Macedonia is based upon a set of projects, initiatives and e-service development which are stated in the relevant documents such as the National strategy for e-content development 2010-2015, the Public administration reform strategy 2010-2015 and the National strategy for e-inclusion 2011-2014. (MIOA, 2015)

As a result of the government's efforts to create a more efficient and transparent administration by presenting to the public all available services for both citizens and business entities the national e-Government portal "uslugi.gov.mk" as the single point of access to information and services of the government was developed. The portal is based on a system with a scalable architecture that allows expanding the capacity when needed. In the next stages of development, the portal will upgrade to allow full two-way communication between citizens and government. The preparation, processing and publication of the portal's content is entirely decentralised and distributed throughout all government institutions. (MIOA, 2015).

Regarding the 20 basic public services (12 for citizens and 8 for businesses) identified by the European Commission and Member States, in the eEurope initiative of 2000, to measure the take-up by businesses and citizens of electronically-available public services, currently in the Republic of Macedonia among the most developed portals providing e-public services in the G2B segment are the e-public procurement (eProcurement system - EPPS), e-customs (the Single Window for Export/Import licenses and tariff quotas system - EXIM), corporate tax and VAT (the eTax service) and from March 2014, registration of a new company (the system for e-registration). The most developed e-public service in the G2C segment is application for building permit i.e. the national electronic system for issuing building permits. Income taxes (declaration, notification of assessment), student grants, enrolment in higher education/university are also available online. The citizenship registers are fully digital, but not available online and not available for interoperability mainly due to technical reasons. The main problem is the availability of digital signature i.e. people do not have digital signature, very few organizations are offering them, they are expensive and the Government is not intensively promoting them. The e-public services in the G2C segment are less developed in comparison with the G2B ones.

Today, the Republic of Macedonia is ranked 96th out of 193 countries by its e-Government Development Index (EGDI), and it is accompanied by countries from South America, Africa and Eastern Europe. EGDI (ranked 0-1) has dropped in the Republic of Macedonia from 0,5587 in 2012 down to 0,4720 in 2014. In terms of the development of E-Government and e-Government index among the countries in the region, the Republic of Macedonia is ranked ahead Bosnia and Herzegovina, while Albania, Bulgaria, Croatia, Greece, Montenegro, Serbia and Slovenia are ranked higher (UN E-Government Survey, 2014). The EGDI is comprised by three components: Online Service Component, Telecommunication Infrastructure Component and Human Capital Component. These scores for the Republic of Macedonia are 0,2441; 0,4521 and 0,7198 respectively (UN E-Government Survey, 2014). The lowest index is the Index of Online Services – IOS (0,2441). This means that the Republic of Macedonia must focus its effort on online services. Therefore it can be concluded that this segment i.e. online services inevitably requires an improvement and further development, especially in the G2C segment.

In the last decade the Republic of Macedonia has made a great progress in the development and the implementation of e-Government. The development of the e-Government is one of the strategic priorities and an additional effort for further improvement in the functionality and sophistication of the e-Government services is expected. The goal of our research, to

investigate the factors affecting the e-Government adoption i.e. the usage of e-public services in the Republic of Macedonia can help in our strategic commitment.

4 Methodology and results

As mentioned previously, the main aim of the research is to investigate the factors that influence electronic public services usage (adoption) in the Republic of Macedonia. Having in mind the variety of types and different levels of sophistication of the EPS, this proved to be very complicated task. Official statistics is not measuring the level of usage of electronic public services. The success and acceptance of e-Government initiatives are dependent on citizens' willingness to adopt and utilise these services. According to the data more than one third of EU citizens (38%) refuse or choose not to go online to use public services (Tinholt et all, 2014). According to the data of the State Statistical Office, in the first quarter of 2015, 70% of the households had access to the Internet at home (of which 99% broadband). In the same period, 69,2% of the total population aged 15-74 used a computer, while 70,4% used the Internet. Internet was most used by pupils and students, i.e. 95% and 71,2% of the Internet users used a mobile phone or a smart phone for accessing the Internet away from home or work. (State Statistical Office, Information Society, News Release 8.1.15.31) The purpose of usage of EPS is presented in Table 1.

Purpose and type of usage	**% of the internet users in the last 12 months**
Have used Internet for interaction with public authorities	31,3
Obtaining information from public authorities' websites	26,3
Downloading official forms from public authorities' websites	13,4
Sending filled in forms to public authorities' websites, electronically	11,2

Table 1: Using the Internet for interacting with public authorities in the last 12 months

Source: Adapted from State Statistical Office, Information Society, News Release 8.1.15.31

In 2011 the State Statistical Office conducted a research to analyse the usage of information and communication technologies in the public sector. In the Table 2, relevant findings from that research are presented.

Available items on the websites	**In %**
Availability for downloading and printing forms	71.8
Receiving/sending filled in forms	32,1
Personalized content for regular visitors, clients	29,5
Online ordering or reservation	5,1
Online payment	2,6
Advertisement of open job positions or online job application	25,6
Sending filled in forms	68,7
Treat administrative procedures completely electronically	31,3
Online notification for public procurement and tender specifications	83,1

Table 2: Purpose of the Internet usage in the public sector, 2011

Source: Adapted from State Statistical Office Information Society, News Release 8.1.11.31

From our own research (Trenevska Blagoeva, 2015) the maturity level measured by the Business Process Interoperability Methodology is the highest in public procurement and taxes.

EPS as a category is very diverse and variable and consists of set of public services that is not constant; actually the number of services is growing and the scope as well. The types and characteristics of users are also very variable. Those two facts, growing number of EPS and their variability of sophistication and the variability of users make the research design complicated and this research can be regarded as the initial pilot in order to get some insights.

We decided to use TAM modified because this methodology is widely used to analyse citizens and businesses acceptance of EPS. On the other hand, UTAUT is used to analyse technology acceptance in organizations. Therefore, TAM is used because the main advantage of this model is that it can be modified to best suit the purpose of the research and it can be extended by using specific constructs when used with new technologies.

The first construct is *perceived ease of use*. In order to get the insights for this construct we defined 5 statements (EPS usage is simple; Web site navigation of the EPS is simple; Assistance via the web site is available if needed; Accessibility for users with special needs; Learning to use EPS is fast and simple). The second construct is *perceived usefulness* with five statements to measure it (EPS offer relevant information; Information are updated; EPS usage improves my performance; EPS usage can bring me savings of time and money; Via EPS it is possible to communicate with the authorized public servant). *Perceived trust* is measured by four questions (EPS are reliable; Privacy is well protected while using EPS; Transactions are secure; Negative consequences are possible if using EPS). The next construct is *user satisfaction*. User satisfaction is measured in our questionnaire by four statements (Satisfaction of the content of the EPS; Satisfaction of the interface of the EPS; Satisfaction of the speed of receiving EPS; Satisfaction of the security while using EPS). The previously mentioned four constructs are influencing the intention and adoption of EPS. *Adoption* is measured by three statements (I have positive attitude towards using EPS; I plan to use EPS; I use EPS frequently).

In this occasion we would like to point out that for the purpose of this research, although demographic factors are considered important external factors influencing technology adoption i.e. e-Government adoption in similar studies (Colesca and Dobrica, 2008; Suki and Ramayah, 2010) we concluded that for our country those factors are not very significant. According to data collected by our survey (supported by the official data from the State Statistical Office of the Republic of Macedonia), demographic factors like age, gender, education, are not determinates of the adoption or the intent to use EPS. Based on the discussion above, the proposed research model is presented in Figure 1 and the following research hypotheses are set.

H1: Perceived ease of use of an EPS will positively influence perceived usefulness of EPS.
H2: High perceived trust will lead to increased perceived usefulness of EPS.
H3: Perceived ease of use while using an e-public service has a positive effect on user satisfaction.
H4: Perceived usefulness of EPS has a positive effect on user satisfaction.

H5: High perceived trust on an e-public service will lead to increased e-Government adoption.
H6: User's satisfaction has a positive effect on the adoption of EPS.

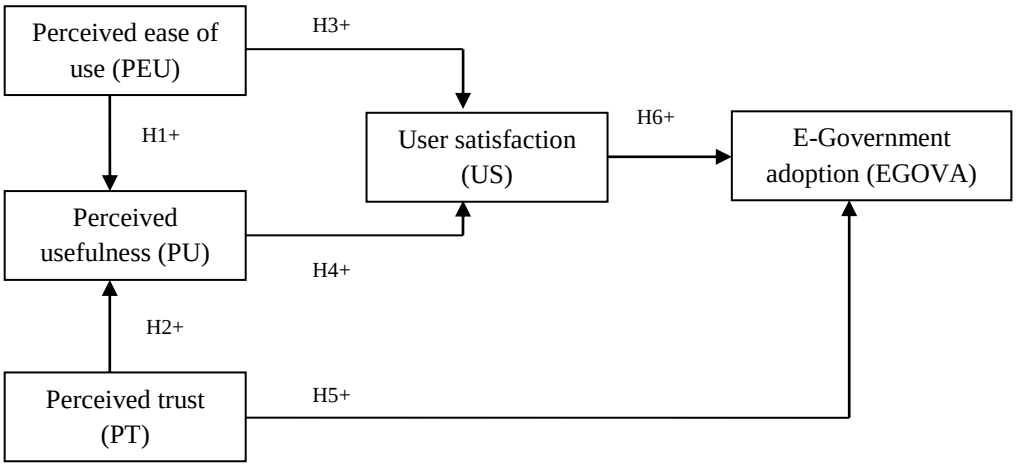

Figure 1: The research model (TAM based)

For the purposes of this research i.e. to analyse the factors that influence electronic public services usage (adoption) in the Republic of Macedonia, a survey was performed based on the previously prepared questionnaire. Regarding the structure of the questionnaire, it consists of six parts. The questions in the first part (A) refer to the demographic characteristics of the sample. All other parts (from B to F) comprise questions regarding the factors that are our research model; for which we assume influence the e-government adoption. A five point Likert scale was used. The research was conducted during the period from October to December 2015. The total number of received answers was 122, but after the filtering of the data, 10 questionnaires were excluded from further analysis due to the missing data (more than 10%), low standard deviation in answers, more than one answer in the fields where three possible options were offered (in the first part of the questionnaire) etc. (Hair, 2010). The total number of questionnaires valid for further analysis is 112. In the Table 3 the demographic characteristics of the sample are presented.

Demographic characteristic	**Item**	**Frequency**	**Percentage**
Gender	Male	50	44,6
	Female	62	55,4
Age	18-29	76	67,9
	30-65	36	32,1
Education	High school	50	44,6
	Bachelor	50	44,6
	Master/PhD	12	10,7
Internet usage	Every day	99	88,4
	Several times per week	10	8,9
	Several times per month	3	2,7
Type of internet connection	From home (PC)	43	38,4

	From work (PC)	14	12,5
	Mobile phone	55	49,1
Citizenship	Skopje (capital)	60	53,6
	Other	52	46,4

Table 3: Demographic profile of respondents

Before testing the hypothesis set based on the proposed research model, we performed a validity and reliability analysis. Cronbach's alpha as a measure of internal consistency, for the data set of the research is 0,84 after excluding the demographic factors and some statements. Those results are considered to be a good measure of scale reliability. Cronbach's alpha was calculated for the constructs explained previously. Since Cronbach's alpha values for some of the constructs (Perceived trust and e-Government adoption) were below the satisfactory level, some of the items in these constructs were deleted in order to improve the sample consistency. From the construct PT we deleted the forth item (Negative consequences are possible if using EPS) and from the EGOVA construct, the third item (i.e. I use EPS frequently), was deleted. After that, the final measures of internal consistency are satisfactory and are presented in the Table 4 below.

Construct (Number of items)	Cronbach's alpha
PEU (5)	0,70
PU (5)	0,67
PT (3)	0,68
US (4)	0,72
EGOVA (2)	0,76

Table 4: Cronbach's alpha for the constructs

Although Cronbach's alpha values for the two constructs PU and PT are below generally accepted level 0,70 (0,67 and 0,68 respectively) we decided to take them into consideration for further analysis since in the literature (Chakrapani, 2004) those values are also considered as satisfactory. A correlation analysis was performed based on each of the constructs defined in the research model. The results of the correlation analysis are given in the Table 5 below.

Constructs	PEU	PU	PT	US	EGOVA
PEU	1				
PU	0,47	1			
PT	0,28	0,32	1		
US	0,49	0,44	0,45	1	
EGOVA	0,24	0,34	0,29	0,22	1

Table 5: Correlation of constructs

As it can be seen from the matrix, there is a significant relationship between the e-Government adoption (EGOVA) and the rest of the constructs, although the relationship varies in strength from one construct to the next. In the Table 6, we summarize the findings regarding the research hypotheses.

Hypotheses	Variable	β	Significance
H1	PEU - PU	0,47	0,000
H2	PT - PU	0,30	0,001
H3	PEU - US	0,52	0,000
H4	PU - US	0,48	0,000
H5	PT - EGOVA	0,25	0,004
H6	US - EGOVA	0,20	0,019

Table 6: Hypothesis results

All the hypotheses are supported on the level of significance of 0,05 and 0,01 (except the H6). We can conclude that perceived usefulness is strongly influenced by ease of use and trust, and is influencing user satisfaction. Namely, user satisfaction is determined by usefulness and ease of use. User satisfaction and perceived trust are influencing the adoption of EPS with significant but not very strong relationship. User satisfaction is an attitudinal construct and we think that it should be included in technology adoption models. E-Government being application of ICT and new way of doing Government is an example of new technology acceptance. It is important to underline the significant relationship between adoption of EPS and perceived trust, because it is pointing out that users of EPS can be attracted by improving their trust while dealing electronically with the Government. Confidentiality, security and trust are important for the users and are guidelines for policy makers, analysts and developers.

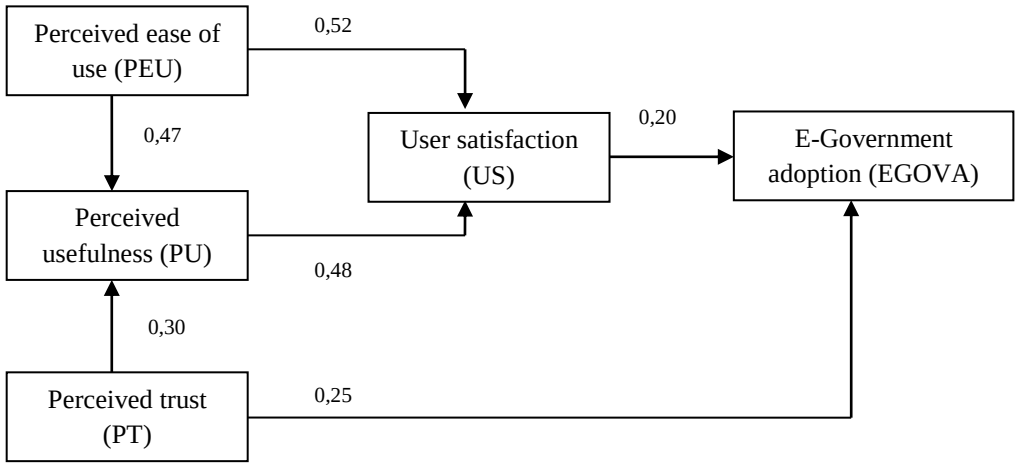

Figure 2: Results of the tested model (and hypotheses)

Conclusion

The aim of the research is to provide insights in factors that facilitate the usage of electronic public services in the Republic of Macedonia. The results proved that well established TAM can be implemented in the case of the Republic of Macedonia.

This research is important from the viewpoint of proving the possibility to use TAM model as technology acceptance model for e-Government adoption. In order to include demographic factors in the model the sample should be very well chosen and structured. Also, for further analysis we think that the distinction between citizens as users and businesses as users should be made and analyzed. However, the typical demographic characteristics such as gender, education level, and even age probably are not significant in our case. Internet usage is also

not differentiator in e-Government adoption in the country. Further research should be focused on business user and demographic characteristics of organizations as well as on channels of access and delivery of services. Furthermore, local government and user centricity can be included in research.

The goal of the research can be elaborated as an indicative study to analyze and predict users' requirements and help design better solutions. User satisfaction, trust, ease of use and usefulness are significant factors for e-Government adoption as general predictors, but their scope and variants should be improved by further examination.

This research represents the first study in this field in the country, hence it could be used as a guideline for policy makers when improving current or implementing new EPS. The follow-up of this research should include more variables and more structured and bigger sample. The process of e-Government adoption is constantly changing and the research of this important topic should follow the development of new relation of the government with its constituents.

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