Factors Influencing the Business Value of e-Government Services for Small and Medium Sized Enterprises

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Abstract

The aim of the current paper is to investigate the factors that influence the use of e-government services by small and medium sized enterprises (SMEs) in Estonia and Germany and to identify the main benefits for users of e-government services. Based on the technological, organisational, and inter-organisational perspectives and relevant theories, the authors have developed a research model depicting relations between the business value of e-government services and the factors that influence it. The model was tested contributing to the methodology of evaluating the relations between model variables. The results point out key factors for e-government service providers which should be addressed in order to better understand the benefits as seen by SMEs, having used e-government services. Distinguishing the business value (benefits) of e-government services both inside and outside the enterprise, a stronger value was found outside the enterprise, affected mostly by external pressure from competitors and industry sources. Service quality appeared to have a direct impact on user benefits, in contrast to the results of previous research. The administrative burden has the weakest influence in both countries. The research is also valuable for practical use as a deeper understanding of the influencing factors in contributing to the e-government strategies within the associated countries.

Acknowledgements

The research has been supported by the Baltic Sea Region Program 2007 – 2013, on the subject: "E-GOvernment solutions as instruments to qualify the public sector for the specific needs of small and medium sized enterPRISEs (SMEs) in the rural BSR (EGOPRISE). The authors are thankful to the partners of the project for their assistance in data collection within the countries under study.

JEL classification codes: M15; O32
Keywords: e-government, online services, small and medium sized enterprises (SMEs)

1. Introduction

The main interest in assessment and development of e-government services for enterprises is connected with finding ways to better satisfy the changing needs of customers (i.e. enterprises). Despite numerous benchmarking projects that have been carried out, a relatively modest number of studies, compared with overall amount of research on e-government issues, have been conducted on the use of and factors influencing the demand of e-government services among SMEs within different environments.

E-government services have been available in developed countries since the 1990s. In their research on this subject, Heeks and Bailur (2007) have pointed out that the term "e-government" appears to have first come into prominence in 1997. The majority of the first ten years of research on e-government focused on the practical and technical dimensions of getting information and services online – including presence, availability, efficiency, effectiveness, capacity, and design. Only later did the research focus shift to the *needs* of users of e-government services and resources (Bertot and Jaeger, 2006). Different research results refer to the fact that the use of e-government services and their implications have still not been studied enough, which is confirmed by various authors (Zhang et al.,., 2014). For example, there is an opinion that the user side of e-government has been mostly overlooked or rarely studied (Groznik and Trkman, 2009). Few studies have examined what factors influence enterprises in their decision to adopt e-government services in their transactions with the government (Lee, Kim and Ahn, 2011; Tung and Rieck, 2005). Few studies have assessed the impact of e-government services on businesses and the several factors identified (e.g. Thompson, Rust and Rhoda, 2005; Badri and Alshare, 2008; Esteves and Joseph, 2008; Khoumbati and Themistocleus, 2006), and a need for evaluation of the business value of e-government was recognised (e.g. Tung and Rieck, 2005; Zhao et al., 2014).

Previous research showed that government to business (G2B) services need to focus on the ability to reduce cost, gather better information, and allow the government to purchase, pay invoices, and conduct business in a more cost-effective manner (Badri and Alshare, 2008). A study testing a model of measuring the business value of e-government found that the use of e-government services has strong positive effects on an enterprise's performance and profitability through revenue expansion (intelligence generation and new businesses) and cost reduction (time savings) (Badri and Alshare, 2008).

The aim of the current study is to develop a model for assessment of factors influencing the business value of e-government services within SMEs in Estonia and Germany, based on

the quantitative study under the Baltic Sea Region Program 2007 – 2013. The model is adopting the overall theoretical framework from previous research (e.g. Tung and Rieck, 2005; Zhao et al., 2014) developing it further, in terms of specifying the influencing factors and distinguishing the external and internal values of enterprises from the use of e-government services. While previous research has, to a large extent, investigated the factors influencing enterprises in their decision to adopt e-government services for transacting with governmental institutions, the current paper offers a step forward by investigating factors influencing enterprises in their perceptions of obtaining actual business value from using e-government services. Based on the aim of the current paper, the following research questions have been described: 'What are the factors influencing the business value of e-government services for enterprises?' and, 'How do these factors influence the use of e-government services?'. The first question was answered by creating a framework of theories and relevant variables based on the literature. The second question was answered by investigating the inter-relation of variables influencing the benefits of enterprises.

However, the actual influence of the factors to the value of e-government services of enterprises is dependent on the context, i.e. the state of e-government maturity in the country. Also, the national culture (e.g. Zhao et al., 2014) and policies used may affect the diffusion of e-government. In the current study, the two countries chosen for investigation have achieved the highest level of digitalisation, but have some differences in e-government policies, which may influence the business value of e-government services. Based on the latest United Nations global e-government survey (2016), Estonia currently ranks in 13th position with the E-government Development Index (EGDI) 0.8334, and Germany is placed in 15th position, having an EGDI of 0.8210. While Estonia has improved its ranking by 2 places compared to 2014, Germany has improved its ranking by 6 places (United nations, 2016). According to the e-government Benchmark report by the European Commission (2016) Estonia is positioned as a member of the mature cluster, which is characterised by the highest level of penetration and digitisation, displaying a success in innovation, making it possible to exploit the opportunities offered by ICT. In Estonia, e-government policies are being enforced top-down. Estonia has been capable to increase the penetration in 2014 - 2015, reaching the mature cluster, exploiting the efforts made in digitalisation. Estonia increased the awareness of its e-government services, which were already of a high quality. Germany is positioned as a member of progressive cluster, which is characterised by a medium level of penetration and a medium level of digitisation. In Germany, e-government policies have to be implemented largely through coordination mechanisms between national, regional and local public authorities, rather than simply being enforced top-down by national authorities. Progress is then more difficult to achieve, as coordination adds another layer to the complexity of the implementation of e-government services (European Commission, 2016). Although 95% of all enterprises in Estonia and Germany have broadband access to the Internet in 2016 (Eurostat, 2017), 83% of all enterprises in Germany and 95% in Estonia used Internet for interacting with public authorities in 2013 (Eurostat, 2017). A deeper understanding of the factors that promote business value from the use of e-government services can help to strengthen e-government diffusion strategies within different countries.

This paper aims to enrich the field of e-government service research by looking more closely at business users from the perspective of the value obtained from the actual use of e-government services. The current study has three features that distinguish it from the existing literature. First, to our knowledge, our study is among the few that examines the

results (i.e. value) of the actual use of e-government services by SMEs. Second, the current research has developed a new conceptual research model depicting relations between the business value of e-government services and the factors influencing it. Although the overall frame of the model aligns with previous research, the operationalisation of research variables were adopted form different sources. Third, a business value (i.e. benefits) from using e-government services is distinguished between external and internal benefits, which helps to better understand the benefits inside and outside the enterprise. A deeper understanding of business value and factors that promote the business value from the use of e-government services can help to strengthen the e-government strategies in countries.

The following section gives an overview of the literature on the factors that influence e-government adoption by business users, and the value or advantage that businesses gain by using such services. Next, the research method and data sample is characterised. The results of the quantitative survey are then discussed. Finally, the article concludes with a discussion and suggestions for further research.

2. Theoretical framework

Understanding the value (definition and description) helps to understand the basis of the value assessment. According to Amit and Zott (2001) for e-business, value is generated in four ways: efficiency (speed, cost, economies in scale); novelty (new structures, new participants, new transactions); lock-in (networks, customisation, trust); and complementary (products, services, technologies, activities). Value generated under any one of these four categories serves as a catalyst for value development in other categories. If the economic value includes revenue generation, cost reduction, asset return and inventory turnover (Zhu, 2004), then non-economic value (e.g. e-government maturity level, stakeholders and assessment dimensions) (Esteves and Joseph, 2008) is also important to consider.

According to Yu (2008) in the e-government literature, research efforts focusing on value related topics are still in an initial stage. In his paper proposing a value-based strategic management process, Yu (2007) identifies a set of e-government related values, including: service values, citizen values, business values, government employee values, administration values, society values and nation values. He further classifies these values into five dimensions, namely: services, public users, government agencies and processes, government service chain, as well as national and global environment. Value metrics mentioned for the service dimension consist of: quality, efficiency, effectiveness, and trust (Yu, 2008).

Rowley has made a proposal for a typology of stakeholder benefits, which together with a typology of stakeholder roles are used to construct an initial proposal for a stakeholder benefits analysis tool (Rowley, 2011). As a result of testing this tool with a group of experts of the eGovMoNet (Verleye, 2010), the following benefits were ranked the highest: accessibility and inclusivity; easy to use; economic growth and productivity (including business competitiveness); integration of the e-government process; reduced administrative burden; and, transparency, openness and trustworthiness. The top three benefits associated with SMEs were: economic growth and productivity (incl. business competitiveness); cost-effectiveness and a reduced administrative burden (Rowley, 2011).

Factors influencing the adoption of electronic government services among businesses in Singapore were studied by Tung and Rieck (2005), drawing on Roger's Innovation Diffusion

Theory and on the literature on network externalities, social influence, and barriers to adoption. They developed a theoretical framework and elaborated research variables and used the items from Chwelos et al., (2001) and Cheung et al., (2000). Authors proposed that perceived benefits, external pressure, and social influences are positively related to the adoption decision of e-government services by enterprises. The factors influencing the diffusion of e-government are also classified into three categories, e.g. technological, organisational and environmental (e.g. Zhang et al., 2014). Despite the different approaches that exist to measure the impact (i.e. business value) of e-government services on different stakeholders, research on the use and value perceptions of G2B services by SMEs needs to be developed further to create a methodology for use in different environments.

Drawing from the study by Chwelos et al., (2001) and the subsequent study by Tung and Rieck (2005) and other research (e.g. Zhang et al., 2014), the use of e-government services in this article is seen from three perspectives: the technological, the organisational, and the inter-organisational perspective and is based on theories which explain these three perspectives (Table 1). Although theoretical conceptualisation is similar to that of previous researchers, our goal of assessing the factors' influence on business value arising from the use of e-government services is different insofar as we are not discussing the businesses adoption of e-government services, but rather how the businesses value the actual use of e-government services. The technological perspective includes Diffusion of Innovations theory, Technology Acceptance Model; the organisational perspective includes Organisational Theories; and the inter-organisational perspective includes Network Externalities Theory and Social Influence Theory.

The technological perspective is based on Rogers' Diffusion of Innovation Theory (Rogers, 2003), where diffusion is defined as 'the process by which an innovation is communicated through certain channels over time among the members of a social society' and where innovation is an idea or an object that is perceived to be new (Rogers, 1995). According to Rogers (2003), the rate of diffusion is affected by an innovation's relative advantage, compatibility, complexity, trialability and observability. According to this theory, businesses adopt new technologies once they perceive that the new technology is compatible with their values and it provides relative advantages. Rogers (1995) defines relative advantage as: the 'degree to which an innovation is seen as being superior to its predecessor'; and notes that it is often expressed as economic profitability, social prestige, or as another benefit. Focusing on 'relative advantage' that Greenhalgh et al., (2004) described even as the *sine qua non* for adoption, the current research emphasis is being put on analysing the assessed value of actual benefits that users of e-government services have described. This choice is further supported by Benbasat and Barki (2007), who argue that only one construct consistently explains a large percentage of the variance in intentions for new technology use: perceived usefulness, or also known as relative advantage. Carter and Weerakkody (2008) suggest future research should focus on the effects of this salient predictor of technology adoption, since it alone is the most significant element of adoption models.

However, the perceived usefulness or benefits for businesses can be seen for both external and internal processes of businesses creating a more comprehensive perspective (Scott, 2001). External forces influence diffusion into the organisation and internal forces influence creation from within. Scott's perspective is creating a possibility for better understanding of organisational behaviour and factors influencing the business value from the use of e-government services within different environments.

The Technology Acceptance Model is widely used to study user acceptance of technology (Carter, 2008). The Technology Acceptance Model has highlighted that the adoption of new technology by individuals is determined by two beliefs: perceived usefulness, defined as the extent to which a person believes that using the technology will enhance his/her job performance, and perceived ease of use, defined as the extent to which a person believes that using the technology will be free of effort (easy to use) (Davis, 1989; Venkatesh and Davis, 2000). In the current research, for the evaluation of technology acceptance by businesses, indicators of satisfaction (i.e. the evaluation of service quality) are used, including the following factors: ease of use; availability of guidelines, service security; usefulness of information; costs of using e-services.

Table 1. Theories used in building research model for assessment of business value of e-government for enterprises

	Theory and author	Main concepts	Used in current article
Technological perspective	Diffusion of Innovations (Rogers, 2003; Carter and Belanger, 2005; Carter and Weerakkody, 2008)	Five characteristics of innovation that determine its rate of adoption: • relative advantage	Relative advantage – our paper names benefits that an innovation, in this case e-government services, can provide to the organisation. Relative advantage can include economic profitability, social prestige, and/or other benefits.
	Technology Acceptance Model (Davis, 1989; Davis et al., 1989; Venkatesh and Davis, 2000; Carter and Belanger, 2005; Carter, 2008)	Perceived usefulness and perceived ease of use lead to system usage.	Service quality (satisfaction) construct – users are describing their satisfaction towards e-government services, i.e. ease of use; availability of guidelines, service security; usefulness of information; costs of using e-services.
Organisational perspective	Organisational Theories (Easterby-Smith et al., 1999; Arendsen et al., 2014)	Barriers to adoption of new technologies	Administrative burden construct – we argue that the time and money currently spent on fulfilling information obligations set by laws, rules and policies in conjunction with the importance of cost reduction to the company, should overcome the barriers to the adoption of e-government services.
Inter-organisational perspective	Network externality (Katz and Shapiro, 1985; Rogers, 1986)	Dependence of other users who are in the same network (Katz and Shapiro, 1985). "The usefulness of a new communication system increases for all adopters with each additional adopter" (Rogers, 1986).	External pressure construct – since government can provide efficiencies derived from e-services only when there is a critical mass of users there is great likelihood that external pressure is exerted on businesses to adopt those services.
	Social Influence Theory (Rhoads, 1997; Rogers, 1995; Rana and Dwivedi, 2015)	Social influence is said to be employed by an agent or practitioner upon a target.	Social influence construct – pressure on businesses to use e-government services because such organisations are viewed more favourably by the public and other organisations.

Source: Compiled by authors

The organisational perspective discusses organisation learning theories (Easterby-Smith et al., 1999), most notably with regard to the barriers to the adoption of new technologies. Barriers to adoption can be considered as the willingness to employ new technologies in order to achieve cost reductions (Tung and Rieck, 2005). Six perceived barriers have been described by Gilbert et al., (2004) for their analysis: confidentiality, easiness of use, enjoyable, reliable, safe, and visual appeal. In addition to lower costs, the businesses may also shorten administrative processes, i.e. save time for administrative activities. Therefore, in the current paper, emphasis is put on the administrative burden construct. Arendsen et al., (2014) have defined the administrative burden as the recurring costs of administrative activities that businesses are required to conduct in order to comply with the information obligations that are imposed through central government regulation, or in other words – the private sector costs of complying with regulations. We anticipate that the time and money currently spent on fulfilling information obligations set by laws, rules and policies, in conjunction with the importance of cost reduction to the company, should overcome the barriers to the adoption of e-government services.

The inter-organisational perspective are the environmental factors (Zhang et al., 2014) that may be expressed through different external factors which, in the current article, are described by network externalities and social influence theory. According to the network externalities aspect, the usefulness of a new communication system increases for all adopters with each additional adopter (Rogers, 1986). E-government is the subject to indirect externality, since government itself uses the benefits of efficiency gains. In order to facilitate shorter administrative turn-around times for processes and enquiries, it is important that a "critical mass" starts to use the e-government services. This means that governments and industry organisations are therefore likely to exert some form of pressure or additional incentives on businesses to adopt electronic services (Tung and Rieck, 2005) like government pressure, industry pressure, and competitive pressure. In the current article, the use of the external pressure construct in the analysis is justified, since governments can provide efficiencies derived from e-services only when there is a critical mass of users and thus there is great likelihood that external pressure will be exerted on businesses to adopt those services.

Social influence theory is important to consider when organisations that take an initiative in adopting e-government services are viewed more favourably by the public or by other organisations (Tung and Rieck, 2005). Social influence theory has been referred to as a theory of media use, as well as a theory of technology use (Webster and Trevino, 1995). According to Venkatesch et al., (2003) social influence is one of the three constructs in unified theory of acceptance and use of technology that have a direct effect on usage intentions. Social influence is defined as the degree to which an individual believes others think he should use a new technology (Carter and Weerakkody, 2008). Rana and Dwivedi (2015) have stated that influence from other important actors, including friends, colleagues, and family, not only enhances an individual's efficiency and performance, but also one's intention to use e-government services.

Based on the abovementioned theoretical framework, our research model includes four independent variables (a) service quality; (b) administrative burden; (c) external pressure; and (d) social influence – we intend to measure the influence that they have on the benefits that e-government service users have identified. The results of the analysis are expected to show whether and how the enterprises are benefiting from using e-government services.

3. Research methodology

3.1. Research design

The research is based on a study undertaken in 2011 under the Baltic Sea Region Program 2007 – 2013, on the subject: "E-GOvernment solutions as instruments to qualify the public sector for the specific needs of small and medium sized enterPRISEs (SMEs) in the rural BSR" (EGOPRISE). The overall aim of EGOPRISE is to turn public administration to more business oriented, to relieve SME-s from administrative burdens, improve their access to information and qualified staff and, as a consequence, to increase the attractiveness of rural areas as places to live, work and invest in.

The focus of the current study is to assess factors influencing the business value of e-government services for enterprises. This is based on a quantitative survey of SMEs in Estonia and Germany, undertaken in 2011. The questionnaire was developed for entrepreneurs, which includes the general data characterising enterprises, the issues of communication between enterprise and government, different aspects of the use of e-government services in enterprises, the opinion of managers and other staff of enterprises about their satisfaction with e-services, as well as the benefits and other factors influencing the use of e-government services.

The analysis is based on the theories described above that have created an overall frame for our research model. The operationalisation of research variables were adopted from different sources found in previous research. Several items are self-developed. Independent variables are factors that presumably influence the extent of benefits perceived by entrepreneurs using e-government services. The description of variables is presented in Table 2.

Table 2. The dependent and independent variables

Dependent variable	
Variable	Items used and supported by different authors
Benefits	• Data security (Carter and Belanger, 2005; Rowley, 2011; Sharma, 2015) • Fast and comfortable service delivery (Carter and Belanger, 2005; Alawneh et al. 2013; Sharma, 2015) • Improves accuracy (Chwelos et al., 2001; Tung and Rieck, 2005) • Less bureaucratic burden (Rowley, 2011) • Tracking and tracing of processes (Alawneh et al. 2013) • Transparency of services and processes (Rowley, 2011) • Reductions/savings of cost in external administrative and financial dealings (Arendsen et al., 2014) • Reductions/savings of cost in internal administrative and financial dealings (Henriksen, 2002; Carter and Belanger, 2005; Arendsen et al., 2014) • Significant reduction of errors in filling the forms (Chwelos et al., 2001; Tung and Rieck, 2005) • Flexible availability of services (Carter and Belanger, 2005; Verdegem and Verleye, 2009; Sharma, 2015)
Independent variables	
Variable	Items
Service quality (satisfaction)	• Availability of guidelines (Verdegem and Verleye, 2009) • Ease of use (Carter and Belanger, 2005; Carter, 2008; Verdegem and Verleye, 2009; Gotoh, 2009; Arendsen et al., 2014) • Service security (Gotoh, 2009; Rowley, 2011; Sharma, 2015) • Usefulness of information (Carter, 2008; Verdegem and Verleye, 2009; Alenezi et al., 2015) • Costs of using e-services (Rowley, 2011)

Administrative burden	• Spending of time (Thompson et al., 2005; Akkaya et al., 2011; Alawneh et al., 2013) • Spending of money (developed by authors)
External pressure	• Pressure from competitors (Iacovou et al., 1995; Chwelos et al., 2001; Henriksen, 2002; Tung and Rieck, 2005) • Pressure from industry sources (Iacovou et al., 1995; Chwelos et al., 2001; Henriksen, 2002; Tung and Rieck, 2005) • Pressure from governmental agencies (Tung and Rieck, 2005) • It is compulsory – I see no other reason but the legally set obligation to use these services (developed by authors) • It is an important way of reducing personnel and operational expenses (Chwelos et al., 2001; Tung and Rieck, 2005)
Social influence	• Perceiving that my organisation will be more attractive to potential investors, partners, and/or customers (Tung and Rieck, 2005) • Society's perception towards my organisation (Carter and Belanger, 2005; Tung and Rieck, 2005)

Source: Compiled by authors

Originally the dependent variable included 17 possible benefits, but based on the notion that answers with less than 40 responses are not statistically reliable for analysis, we decided to eliminate such cases and were left with 10 benefits. The benefits omitted from our analysis included: "I don't see any benefits"; "There are some advantages, but we are obliged to use government services anyhow"; "Enhanced ability to compete"; "To be as successful as other organisations in the same industry/sector"; "Less corruption"; "Excludes manipulation; "Tailor-made services". All independent variable items were included in the analysis.

3.2. Sample characteristics

The interviews were conducted via telephone survey among enterprises selected randomly according to their location (different counties) and size (number of employees). Additional attempts were made in order to obtain responses from enterprises in different industries and development perspectives (increasing/not increasing number of employees). 209 enterprises were involved in the survey – 162 from Estonia and 47 from Germany. In our analysis, we have used data only from those respondents who admitted using e-government services, i.e. 151 from Estonia and 34 from Germany. By location, 35% of enterprises within the total sample were situated in a rural area, and the rest in urban or suburban areas. By size, most of the enterprises are micro and small enterprises, In terms of economic sector, companies were divided almost equally into service and industry sectors: 50% service, 49% industry. 18% were enterprises with an increasing number of employees; in 82% of enterprises, the number of employees did not increase (they were stable or decreasing) during the period of the survey (Table 3).

Table 3. General sample characteristics

		Estonia	%	Germany	%	Total	%
Location of headquarters	rural	49	32	15	44	64	35
	urban	102	68	19	56	121	65
Economic sector	Industry and Agriculture	73	48	18	53	91	49
	Service	78	52	15	44	93	50
Size[1]	micro, small	126	83	27	79	153	83
	average, large	25	17	7	21	32	17
Change in the number of employees[2]	increasing	21	14	13	38	34	18
	not increasing	130	86	21	62	151	82
Total		151	100 %	34	100 %	185	100 %

Note: [1] micro/small category has 1–49 employees; average/large category has 50 and above employees.
[2] number of employees in 2010 compared to 2009.
Source: Authors calculations based on survey database

Due to the limited amount of responses from German enterprises, it is possible to analyse the results of two countries together to make conclusions on the basis of a larger number of respondents (185). It is possible to analyse the data of Estonia individually. We are searching for any differences of factors influencing the business value of e-government services in order to highlight any possible distinguishable national characteristics about the benefits of using e-government services.

The reliability of the sample is checked using Cronbach's alpha, which is 0.59 for all data of Estonian and German respondents – for Estonian respondents alone it is 0.64, which is on an acceptable level (Table 4). Internal consistency is on a good level for benefits and service quality. Cronbach's alpha shows that the 10 items in the benefits variable have rather a strong connection with regard to the total sample, and with regard to only Estonian data as well. The same conclusion can be made regarding the service quality variable that illustrates customer satisfaction towards the five e-government services studied. Also, the external and internal benefits of Cronbach's alpha are at a good level. The analysis shows that the administrative burden is not reliable in the case of two countries together (Cronbach's alpha 0.09), and for Estonia (Cronbach's alpha -1.98). But if we take the administrative burden of German data, then Cronbach's alpha is 0.71. Therefore, for most dependent and independent factors, Cronbach's alpha allows us to make conclusions from the analysis about the influence of factors affecting the business value of using e-government services.

Table 4. Reliability of the sample using Cronbach's Alpha

Cronbach's Alpha	Est+Ger	Est
Benefits	0.85	0.84
External pressure	0.50	0.61
Admin burden	0.09	-1.98
Social influence	0.56	0.58
Service Quality	0.72	0.75
All together	0.59	0.64
External benefits	0.84	0.80
Internal benefits	0.72	0.68

Source: Compiled by authors

3.3. Methods of analysis

In the current article, four research methods are used in order to analyse the survey data: factor analysis; Pearson's correlation; linear regression; and descriptive statistics.

We used factor analysis in order to group the dependent variable items into components. The extraction method used was Principal Component Analysis, and the Rotation method used was Varimax with Kaiser Normalization. We continued with Pearson's correlation between dependent (Benefits) and independent (External pressure, Administrative burden, Social influence, and Service Quality) variables in order to illustrate the model's statistical reliability and to assess the impact of each independent variable on dependent components. Next, multiple regression analyses were conducted in order to search for statistically significant items influencing the benefits of using e-government services. Methods Enter and Forward were used. The multiple correlation coefficient R was used for assessing the impact of the independent variable group on benefits. An R^2 coefficient of determination was used in order to identify the explanatory power of the dependent variable. An unstandardised regression coefficient (B) is assessing how each item within the independent variable is influencing the dependent variable (External Benefits Component, and Internal Benefits Component). A standardised regression coefficient (Beta) enables us to compare the impact of each independent variable item to the dependent variable components.

4. Findings

4.1. Factor analysis for grouping the business value, i.e. benefits

In the current paper the external and internal benefits of businesses are distinguished, making it possible to more specifically analyse the impact of each factor on the business value of e-government services. For that reason, using the two countries' data sets together we conducted a Principal Component Analysis in order to group the benefits into statistically reliable factors. As a result, 2 factors emerged with 7 items within Component 1 and 3 items within Component 2. Based on the characteristics of each item within a component they express, it is justified to name them External Benefits and Internal Benefits, respectively. Table 5 shows factor loading values which depict how strongly one single component (i.e. benefit) is related to a factor (group). Both business benefits components have a very strong relationship with their factors. The External Benefits Component is foremost characterised by data security, fast and comfortable service delivery, as well as improved accuracy whereas the aspects of service transparency, traceability, and savings in costs are somewhat weaker characteristics in this particular factor. The Internal Benefits Component, however, is clearly best described by the savings of cost within the organisation. Cronbach's Alpha values of External Benefits Component (0.84) and Internal Benefits Component (0.72) both indicate a good internal consistency.

The External Benefits Component includes items that are mainly related to aspects associated with benefits arising from using e-government services from outside the company, like improving the accuracy of services, having secure data transmission, being able to track and trace the processes, and reducing the costs in external administrative and financial dealings. On the other hand, the Internal Benefits Component comprises three items that

relate mainly to benefits seen inside the enterprise: reduction of errors in filling forms, reduced costs in internal administrative and financial dealings, and flexible availability of services.

Table 5. Rotated Component Matrix[a]

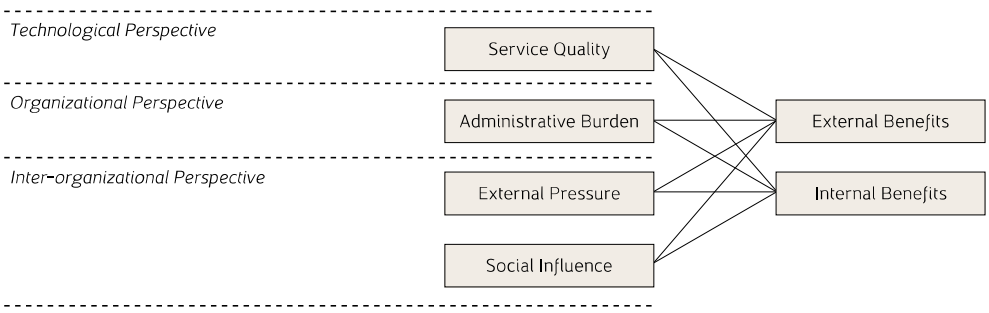
	Component		
	1	2	
Data security	.794	-.061	External Benefits Component (EBC)
Fast and comfortable service delivery	.742	.022	
Improves accuracy	.720	.408	
Less bureaucratic burdens	.681	.368	
Track and tracing of processes	.637	.311	
Transparency of services and processes	.549	.392	
Reductions/savings of cost in external administrative and financial dealings	.531	.446	
Reductions/savings of cost in internal administrative and financial dealings	.016	.835	Internal Benefits Component (IBC)
Significant reduction of errors in filling forms	.241	.758	
Flexible availability of services	.189	.670	

Notes: Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.
a. Rotation converged in 3 iterations.

Source: Compiled by authors

The two benefits components provide the means to more specifically analyse the impact of each independent variable on the business value of e-government services. It is evident that enterprises have listed benefits that are identified within the organisation (e.g. a significant reduction of errors in filling forms) and, on the other hand, benefits that occur outside the organisation (e.g. transparency of services and processes). The items included into the External Benefits Component and Internal Benefits Component are clearly providing a relative advantage to e-government service users, compared to enterprises that still use the traditional means of communication to interact with governmental institutions. Based on the results from the factor analysis, it is possible to design a conceptual model that links the business value of e-government services for enterprises (both benefits components) with the independent factors that are influencing it, thus giving us a comprehensive concept of technological, organisational, and inter-organisational perspectives (Figure 1).

Figure 1. A conceptual research model depicting relations between the business value of e-government services and factors influencing it



Source: Compiled by authors

In the following subchapter we elaborate on the extent of the independent variables influence on external and internal benefit components.

4.2. Assessing factors influencing the business value of e-government services for enterprises in Estonia and Germany

Correlations between multiple regression analyses between the dependent variable and independent variables of combined data of Estonian and German respondents illustrates the model's statistical reliability (Table 6). As a result, we can see a medium level relation between the independent variable – External Pressure – and the dependent variable – External Benefits Component (EBC) (R=0.402). Based on the Rsquare result (Rsquare=0.162), we can say that slightly over 16% of the variance within EBC can be explained by the External Pressure variable. This result is in line with the network externality theory, according to which pressure from government, industry and competitors have a positive effect on the benefits that enterprises perceive when using e-government services. The relation between Service Quality and EBC was also medium level (R=0.362), and roughly 13% of the variance (Rsquare=0.131) within EBC is explainable via the Service Quality variable. This result indicates that satisfaction with e-government services is in positive relation with benefits like a secure, accurate, and transparent way of interacting with governmental institutions. There is no significant relation in between EBC and the Administrative Burden, neither between EBC and Social Influence variables. Thus, enterprises do not sense a significant reduction in time and/or costs related to e-government service use, nor do they feel a positive effect on their social status.

All relations between the Internal Benefits Component (IBC) and the independent variables were clearly weaker. External Pressure still had the most impact on IBC (R=0.260), but with less than 7% of the variance explained by this independent variable. The Social Influence and Service Quality variables had almost identical relations with IBC with R values of 0.203 and 0.195 respectively. Pressure from government, industry and competitors is therefore the most significant impact on internal benefits, compared to satisfaction of service use and social influence.

The Estonian data set analysis indicates the lesser influence of External Pressure and Service Quality variables to EBC, compared to the results of the combined data of Estonian and German respondents. However, the correlation is more evenly divided among the four independent variables (R values between 0.211 and 0.282). Based on the Rsquare values we can say that 4 - 8% of the variance within EBC can be explained by independent variables. Such a result indicates differences in the influence of factors to the EBC arising from the use of e-government services in the two countries. Such significant discrepancies between the two countries could not be seen in the case of IBC, with the exception of the Administrative Burden in Estonia. In the latter case, enterprises did not see reductions in the time and money spent when interacting with government agencies via electronic channels. The Administrative Burden also has the weakest influence in Germany. Further research is needed in order to determine how the administrative burden could be linked to the business value of e-government services.

Table 6. Correlations between dependent and independent variables

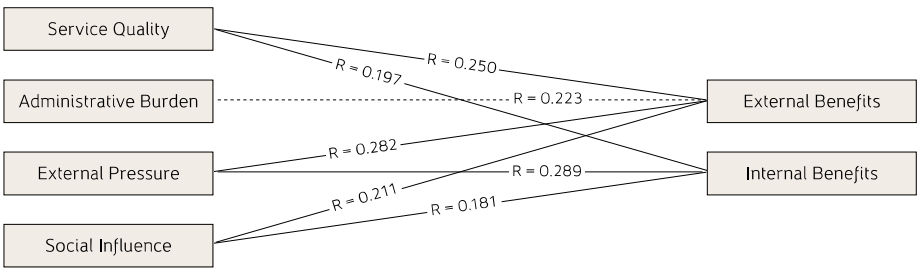
External benefits component (EBC)	R	R Square	Adjusted R Square	Internal benefits component (IBC)	R	R Square	Adjusted R Square
Estonia + Germany							
Service quality	.362[a]	.131	.105	Service quality	.195[a]	.038	.009
Administrative burden	.122[b]	.015	.005	Administrative burden	.102[b]	.010	.001
External pressure	.402[c]	.162	.140	External pressure	.260[c]	.068	.043
Social influence	.098[d]	.010	.000	Social influence	.203[d]	.041	.031
Estonia							
Service quality	.250[a]	.063	.029	Service quality	.197[a]	.039	.004
Administrative burden	.223[b]	.050	.038	Administrative burden	.044[b]	.002	-.011
External pressure	.282[c]	.080	.050	External pressure	.289[c]	.083	.054
Social influence	.211[d]	.045	.033	Social influence	.181[d]	.033	.021

Note:
a. Predictors: (Constant), Costs of using e-services, Usefulness of information, Service security, Availability of guidelines, Ease of use
b. Predictors: (Constant), How do you evaluate spending of money for fulfilling information obligations from public laws, rules and policies?, How do you evaluate spending of time for fulfilling information obligations from public laws, rules and policies?
c. Predictors: (Constant), Importance of external factors: it is compulsory, Importance of external factors: pressure from competitors, Importance of external factors: pressure from industry sources, Importance of external factors: importance in cost reduction, Importance of external factors: pressure from government institutions
d. Predictors: (Constant), Importance of external factors: society's perception, Importance of external factors: perception of attractiveness

Source: Compiled by authors

A visualisation of the correlations between independent and dependent variables based on Estonian data is shown in Figure 2, where three independent variables (external pressure, social influence, and service quality) are clearly linked to external and internal benefits. A question arises regarding the link between administrative burden and the two benefits constructs – there is no relevant connection between administrative burden and internal benefits, and only a weak link between administrative burden and external benefits. Since Cronbach's Alpha did not support the reliability of the administrative burden variable, we have marked its relation to external benefits with a dashed line and hereby indicate a need for further research in order to specify this relationship more clearly.

Figure 2. The relation of variables according to the research model



Source: Compiled by authors

The authors have conducted a regression analysis between dependent and each independent variable in greater detail with the Estonian data set (Table 7) in order to search for statistically significant items that influence the benefits of using e-government services. Similar to the analysis conducted with the combined data set of Estonian and German respondents, we describe the significance of each item within the context of four independent variables: External Pressure, Administrative Burden, Social Influence, and Service Quality.

Table 7. Regression analysis showing the relation between the dependent variables and the items of each independent variable (Estonian data)

Coefficients[a]				Coefficients[b]			
Service quality	B	Beta	Sig.	Service quality	B	Beta	Sig.
(Constant)	.915		.561	(Constant)	2.236		.019
Ease of use	.488	.121	.265	Ease of use	.394	.165	.133
Availability of guidelines	-.866*	-.228*	.028*	Availability of guidelines	-.161	-.072	.493
Service security	.444	.117	.212	Service security	-.087	-.039	.682
Usefulness of information	.374	.101	.319	Usefulness of information	-.013	-.006	.953
Costs of using e-services	-.034	-.010	.913	Costs of using e-services	-.323	-.166	.084
Administrative burden	B	Beta	Sig.	Administrative burden	B	Beta	Sig.
(Constant)	-.804		.532	(Constant)	1.816		.022
Evaluation of spending of time for fulfilling information obligations from public laws, rules and policies?	.271	.113	.208	Evaluation of spending of time for fulfilling information obligations from public laws, rules and policies?	-.072	-.051	.582
Evaluation of spending of money for fulfilling information obligations from public laws, rules and policies?	.708*	.257*	.005*	Evaluation of spending of money for fulfilling information obligations from public laws, rules and policies?	-.036	-.022	.810
External pressure	B	Beta	Sig.	External pressure	B	Beta	Sig.
(Constant)	1.741		.002	(Constant)	1.088		.001
Pressure from competitors	-.366*	-.215*	.020*	Pressure from competitors	-.010	-.010	.917
Pressure from industry sources	-.032	-.015	.863	Pressure from industry sources	-.245*	-.195*	.026*
Pressure from government institutions	.244	.157	.067	Pressure from government institutions	.059	.063	.456
Importance in cost reduction	.356*	.223*	.008*	Importance in cost reduction	.223*	.234*	.005*
It is compulsory	-.092	-.054	.509	It is compulsory	-.018	-.018	.825
Social influence	B	Beta	Sig.	Social influence	B	Beta	Sig.
(Constant)	1.722		.000	(Constant)	.999		.000
Perception of attractiveness	.364*	.232*	.007*	Perception of attractiveness	.168*	.179*	.038*
Society's perception	-.152	-.090	.290	Society's perception	.005	.005	.955
a. Dependent Variable: External benefits component (EBC)				b. Dependent Variable: Internal benefits component (IBC)			

Note: *statistically significant at level 0.05
Source: Compiled by authors

In terms of Service quality, there was a modest negative relation between the Availability of guidelines and EBC (Beta=-0.228). It shows that enterprises are not satisfied with the availability of guidelines for e-government services. Since all of our respondents are e-government service users, we can assume that enterprises have accepted the electronic services, but due to problems with availability of guidelines the service experience is not generating external benefits.

The Administrative Burden variable comprises two items, and the Evaluation of spending money for fulfilling information obligations is clearly related (Beta=0.257) to EBC, with a significance level of 0.005. In comparison to the results of the Estonian and German companies combined, this item stands out among Estonian companies only. IBC was not affected by the items within the Administrative burden variable.

Within the External Pressure variable the most significant item in relation to EBC is Importance in cost reduction (Beta=0.223). Since this is a positive relation, we can state that companies that are emphasising cost efficiency gained from using e-government services also see more external benefits. Another statistically significant relation is between Pressure from competitors and EBC (Beta=-0.215). This indicates that companies who admit to using e-government services due to competitive pressure do not feel as much external benefits gained from it than compared to companies who do not admit to having competitive pressure to use e-government services. The other items within the External Pressure variable are not significant in terms of EBC. In the case of IBC, the relations are quite similar with the exception that instead of Pressure from competitors, it is now the Pressure from other industry sources that is having a negative relation (Beta=-0.195). The most significant item is still Importance in cost reduction (Beta=0.234).

In the case of Germany, the only significant items in relation to EBC and IBC can be found from the factor of External pressure, which are the pressure from industry sources and government institutions (Table 8). The other three factors (administrative burden, social influence and service quality) did not show any significant influence on the benefits.

The social influence variable is behaving identically in the cases of both EBC and IBC. The item Perception of attractiveness is having a strong relation (Beta=0.232) with EBC, and also with IBC (Beta=0.179). Society's perception of companies, on the other hand, did not have a significant relation to either of the EBC and IBC.

Table 8. Regression analysis showing the relation between dependent variables and the items of each independent variable (German data)

Coefficients[a]				Coefficients[a]			
External pressure	B	Beta	Sig.	External pressure	B	Beta	Sig.
(Constant)	0.520		.200	(Constant)	-1.010		.350
Pressure from competitors	.070	.200	.320	Pressure from competitors	.340	.310	.090
Pressure from industry sources	-.270*	-.580*	.000*	Pressure from industry sources	-.740*	-.540*	.000*
Pressure from government institutions	.250*	.560*	.020*	Pressure from government institutions	.870*	.660*	.000*
Importance in cost reduction	-.140	-.340	.080	Importance in cost reduction	-.270	-.230	.190
It is compulsory	-.130	-.320	.140	It is compulsory	.220	.180	.260
a. Dependent Variable: external benefits				a. Dependent Variable: internal benefits			

Note: *statistically significant at level 0.05
Source: Compiled by authors

Although the relations between dependent and independent variables have turned out to be modest, our analysis has, at least, proved their existence. The results of the assessment on the basis of a significance of factors influencing the business value of e-government services for enterprises in two countries allows us confirm the validity of the methodology used.

5. Discussion and conclusion

The current paper contributes to the field of e-government research by developing the perspective for assessing which factors influence the actual business value of e-government services, from an enterprises experiential point of view. In order to achieve this target, we relied on the overall theoretical framework of previous research and proposed a new research model, where the operationalisation of research variables were adopted form different sources. At the same time, unlike previous research, the business value (i.e. benefits) from using e-government services are distinguished between external and internal benefits, which helps to better understand the benefits inside and outside of the enterprise.

Based on the survey data analysis, we have shown that our research model proved to have significant relations between independent and dependent variables, although the relation was moderate at most. It means that, in reality, the influence of factors on business value seen by enterprises through using e-government services is lower than was initially expected by the authors. Enterprises in Estonia and in Germany are experiencing the strongest correlation between the external pressure variable and benefits variables, both of which were statistically significant. These results are in line with the previous studies conducted on electronic data interchange adoption (Chwelos et al., 2001) and on e-government services adoption (Tung and Rieck, 2005). However, in our case we can say that enterprises that are already using e-government services acknowledge external pressure as a factor not only to use these services but as a factor to distinguish benefits from using e-government services. Yet, from network externalities point of view, the results are intriguing, since both Estonia and Germany are already witnessing widespread usage of e-government services and from a service user point of view, the external pressure should no longer be so evidently recognisable – using e-government services has long been a natural course of interacting with governmental institutions (83% of enterprises in Germany and 95% in Estonia in 2013) (United nations, 2016). Besides, 80% of enterprises in Estonia and 61% of enterprises in Germany used the Internet for returning filled in forms electronically (Eurostat, 2015).

Social influence also proved to be significant. Using e-government services is perceived to give the enterprise certain attractiveness amongst its stakeholders. Having stated this, it should be stressed that in some e-government service areas (e.g. public tenders) one cannot even participate using traditional paper or through face-to-face channels, thus the effect of social influence on benefits should diminish in the future.

The variable with least significance towards benefits was administrative burden. It had no significance towards internal benefits in Estonia, and towards external benefits in Germany. These results are in line with Tung and Rieck (2005), who stated in their research that the costs related to e-government services adoption are so insignificant that there seem to be no, or at least only very low, barriers to adoption. We can suggest that enterprises in Estonia and in Germany did not see the amount of time and money spent on e-government services as a significant factor in distinguishing benefits from using these services. A similar conclusion was reached by Arendsen et al., (2014), when they stated that businesses in the Netherlands do not perceive direct relationships between perceived organisational benefits and the reduction of the administrative burden.

We also witnessed a significant relationship between the service quality variable and benefits variables. This is somewhat contradictory with previous research (Gotoh, 2009) that identified only an indirect impact on user benefits. However, our results are in line with

Sharma (2015) who stated that users are more concerned with the reliability of e-government services and particularly concerned about the service security, as personal and confidential data are stored and processed over the Internet. It is thus very encouraging to see that enterprises in Estonia and Germany do feel that developing more user-friendly and easier to use services helps them distinguish benefits from e-government services.

In addition, the results of the current research clearly distinguish the business value (benefits) of e-government services within and outside the enterprise. A stronger value was discovered outside the enterprise affected mostly by external pressure from competitors and industry sources, as well as by importance of cost reduction. This information is also valuable for practical use as a deeper understanding of influencing factors contributes to the e-government strategies in other countries. The research model suggested helps to understand the factors influencing the value of e-government services for enterprises on the one hand, and gives a benchmarking opportunity for e-government service providers to assess the influence of factors on the business value of the services to their target audience – enterprises.

6. Limitations and future research directions

There are several limitations in our research. First, the small amount of respondents from Germany may affect the generalisation of our findings to all SMEs in Germany. We acknowledge that the survey was conducted in a way that would include responses from a diversified set of enterprises in Germany, but this had a negative effect in getting enough responses to be able to conduct in depth statistical analysis based on those few responses. Second, in terms of generalisability of our results to other countries' business users of e-government services, we should stress that Estonia and Germany are very highly ranked among e-government service users and having also advanced the level of sophistication of such services. Probably similar research in countries with fewer e-government service business users and/or with fewer or less sophisticated services available would result in a different outcome. Finally, our research targeted only small and medium sized enterprises that already use e-government services. We acknowledge the fact that applying a similar research model to large multinational corporations might result in a different outcome.

Having described all the limitations above, we should point out that in these limitations also lay the opportunity for further research on this topic. The research was carried out some years ago, but the research model developed may be a basis for a longitudinal study assessing the change in business value of e-government the enterprises are experiencing. It would be interesting to try our model in new countries, and on a more diversified set of enterprises in terms of size and level of internationalisation. Future research related to e-government business users might also include additional electronic communication channels, such as interacting with public authorities via mobile phones and tablets. Furthermore, in light of the Digital Single Market as one of the top 10 priorities set by the European Commission, the aspect of cross-border service offering within the EU is worthwhile to investigate, especially among multinational corporations that have operations in several EU member countries.

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