LUND UNIVERSITY
School of Economics and Management

Master's programme in Innovation and Spatial Dynamics

Innovation in national e-governments. Estonia as a role model in the citizen-centric approach?

Daniel Kozák
da5875ko-s@student.lu.se

Abstract: Due to substantial progress in ICT, governments now have great possibilities to promote interaction with their citizens online. However, the recent experience suggests that citizens in some countries are gaining low value for money from investments into national e-governments. On the contrary, Estonia is often presented as the example of a country which although its economic history managed to reach levels of world leaders in the digitalization of public services. The thesis aimed to investigate whether the Estonian e-government performs similarly well from the perspective of citizen-centric focus. For the measurement purposes, the quantitative research introduced new composite index - E-government Citizen-centric Quality Index. In the index, Estonian e-government was compared to six selected European economies in dimensions related to citizen's perception of e-government quality. In order to cover multiple dimensions, qualitative research is presented as a supplement. The sample group tested central e-government portals of both Estonia and Slovakia for the information search regarding various life events. Following interviews evaluated the user-experience with both portals. According to the results, Estonia in the ECQI indicator significantly outperformed similar economies – Slovakia and the Czech Republic. Estonia reached higher score in the indicator than the usual leaders in e-government rankings – Sweden and France and ranked first among all assessed countries. The excellent citizen-centric focus of their e-government was also supported by the interviews. Estonian e-government policies and frameworks can, therefore, be considered as a role model in the citizen-centric approach. The inspiration is mainly intended for countries that currently suffer from negative public perception and low adoption rates in their national e-governments.

Key words: innovation in the public sector, e-government in Estonia, citizen-centric approach

EKHS31
Master's Thesis, first year (15 credits ECTS)
June 2018
Supervisor: Jonas Ljungberg
Examiner: Karl-Johan Lundquist
Word Count: 15 165

Acknowledgements

I would like to express my gratitude to all people who contributed to my thesis in any form. First of all, a sincere thank you is dedicated to my supervisor Jonas Ljungberg and assisting supervisor John Källström who provided me with the plenty of useful comments and feedback. I also would like to thank all ten interviewees; without their time and effort, my qualitative research would not be possible. Another mention is intended for Julienne Stewart-Sandgren, whose comments in the early stage of writing helped me to design my research. Last but not least, I am very grateful to my family and friends who successfully managed to keep me in a good mood through the whole process of thesis writing.

Daniel Kozák
June 2018
Lund University

Table of Contents

List of Tables

List of Figures

1 Introduction

The introduction is an insight into the thesis topic and will explain the motivation for the research in the background section. In addition, it will also further specify the aim of the thesis, potential contribution, and the outline.

1.1 Background and problem statement

One of the roles of the state is to provide its citizens with efficient services that increase overall welfare in the economy. Due to substantial progress in ICT in recent 30 years, bureaucracy and administrative burden might be significantly reduced if a country manages to implement benefits of the latest technological innovations into its services. An e-government is an online platform where a state connects to its citizens and enables provision of information and services what usually reduces the need for physical personal communication. Therefore, if a country has a user-friendly and innovative e-government, citizens can potentially expect various positive effects to arise.

In general, researchers identify several key benefits that might digitalization of government services bring to the economy. For instance, improved quality in provided public services, operational cost reduction, time savings for citizens, and boosting the overall innovation in the economy are presented (see Corydon et al, 2016; OECD, n.d.) While scholars are mainly focused on the effects of e-government in the administrative context, there seems to be lack of specialization on the citizen experience with using online e-government services. The perception of actual users has an influence on the technology adoption rate and therefore, it directly affects the fulfillment of the mentioned potential.

Although the government focus on online interaction with its citizens might predict many benefits for the economy, there has been a vivid debate among the general public in Slovakia and the Czech Republic in recent year pointing at considerable investments into national e-governments which did not lead into large and noticeable improvements from the perspective of user-experience. Both countries are therefore still facing rather negative public opinions regarding governmental online services (see articles by Hendrych, 2017; Buchláková, 2017; Raábová, 2018). The use of traditional face-to-face communication with governmental agencies still remains a preferable option in both Czech Republic and Slovakia. The number of e-government users in these countries is much lower than the average of EU countries (European Commission - Digital Economy and Society Index, 2017). Therefore, both countries are looking for a role model to copy e-government policies from in order to increase these numbers. Recently, Estonia is often presented in various national media as an example country, which in spite of the negative economic and political situation in the second half of the 20th century, managed to become one of the leaders in the quality of e-government in 21st century (see for example Kubátková, 2017; Hort, 2016; Raábová, 2015). Is the experience of

citizens with e-government online platform significantly better in Estonia or do some other factors mainly account for the difference in international e-government comparisons? Should government officials look for inspiration in Estonian policies when adjusting the design of e-government platforms to be more citizen-friendly?

Estonia is, in fact, the leader in e-government in the CEE region. In the Digital Economy and Society Index (European Commission – DESI by components, 2017), it ranked 9th in Europe, but first among CEE countries. In the E-government development index (EGDI) 2016 it ranked 13th in the world, also far best from the CEE region (UN, 2016). However, mentioned rankings are not well suited to measure whether user-experience is superior when using e-government services in Estonia. The DESI ranking consists of other categories and sub-categories that do not seem to be directly related to the citizen's experience. In the EGDI ranking (UN, 2016), one category aims to measure the citizen perspective – Online Service Index; however, it is assessed by the trained experts, whose role is only to mark whether e-government website does include specific function or not and therefore its value is limited. There is no category for evaluating factors like the ease of use, design or intuitiveness in these rankings. In overall, there does not appear to be one specific indicator that could provide sufficient data to answer the question of quality perceived by users. Therefore, a more comprehensive tool is desired.

1.2 Research question and objectives

The main aim of this thesis is to answer the following research question:

RQ1: How is the Estonian e-government quality from the user perspective in a relative benchmark to similar European economies – such as Slovakia?

Research design will use the mixed methods approach. The empirical part will be based on the framework by Papadomichelaki and Mentzas (2009), who developed unique and applicable assessment dimensions to measure the quality of e-government from the citizens' perspective. Both quantitative and qualitative approaches are needed to cover all of its dimensions and examine the quality of Estonian e-government in the chosen aspect. The quantitative section will introduce a new composite index – E-government Citizen-centric Quality Index (ECQI), which will be used to compare Estonian e-government to other selected European economies. The index will be based on the specific weighting of scores in sub-indexes gathered from various popular e-government-related rankings published in recent two years. Each of the sub-indicators will evaluate one of the dimensions developed by Papadomichelaki and Mentzas (2009).

However, not all dimensions can be covered by the ECQI indicator, and therefore, the mixed design is selected in order to assess the quality of citizen-centric focus of Estonian e-government more in detail. The qualitative part of the approach will be based on 10 semi-structured interviews with a sample group, which will test central e-government platforms of

both Estonia and Slovakia. The answers of respondents will be processed and assigned to remaining dimensions, which will then be evaluated. Research methods will be further discussed in the Methodology and Data collection section.

1.3 Potential contribution

Innovation in the public sector and more specifically in national e-governments is currently an under-theorized concept, mainly from the view of traditional innovation literature, what will be shown in the next chapter. Therefore, one of the contributions of the thesis will be in suggesting the importance of studying innovation in national e-governments by innovation scholars in the future. In addition, the thesis aims to determine the citizen-centric quality of Estonian e-government. It will introduce new, more relevant composite index to internationally benchmark the citizen-centric quality of e-government platforms in quantitative terms. The thesis will also directly compare the user-friendliness of two national e-government portals by the same sample group of non-experts what is a very unique research. The practical contribution is mainly for governments of states that already have some level of digital public services present and have committed to further innovate in their national e-government; however are currently suffering from low adoption rates and are under the pressure to deliver more citizen-friendly online environment. These countries might be looking for a foreign successful example to copy related policies from. The review of theory and literature on concepts of e-government and its effects on citizens might be beneficial for governmental officials of developing countries who are at the beginning of the journey to establish a well-working e-government in their country.

1.4 Outline

The thesis is structured into 5 main chapters. The following chapter Theory and previous research aims to present the reader with an overview of the topic. Its intention is to explain and critically discuss the basic terms, concepts, and knowledge associated with the innovation in e-government. While first sections are more general, the last three sub-chapters are directly related to the Estonian case and to the framework for the empirical research. In the chapter Methodology and Data collection, the research design is further explained. While the quantitative part describes the sources of the data and explains the ranking composition, qualitative part is focused on the sample group selection and design of semi-structured interviews. Both parts will include limitations of the methodology. The fourth chapter is devoted to the results of mixed method approach which are followed by a joint discussion. The last chapter of the thesis is the conclusion, where the fulfillment of the main goal and additional objectives will be discussed. It will also include the main points of the study, its limitations, and ideas for the future research.

2 Theory and previous research

This chapter is presented as an overview of the topic. In the first two sections, the concept of e-government is described and the connection to the current innovation literature is explored. The theory about technology adoption is then applied to an e-government. To understand the difference between the innovation in the private and public sector, third sub-chapter is presented. It is followed by the discussion about potential benefits of a modern e-government. In the later part, the innovation in Estonian e-government and factors explaining it are discussed based on various empirical studies. Next, the framework developed by Papadomichelaki and Mentzas (2009) is introduced and adjusted for the needs of empirical research of the thesis. The final part explores the guidelines Estonia has created to build a uniformed citizen-friendly e-government platform.

2.1 The concept of e-government and e-governance

While some scholars still continue to use terms e-government and e-governance as synonyms, a literature distinguishes between them (Kitsing, 2011). Both are related to the use of ICT technology in government. However, for the purpose of the thesis, it is necessary to outline a closer focus.

The origins of the concept of e-government can be found in the United States. In 1997, the US vice-president Al Gore was responsible for publishing blueprint for electronic government – Access America, which highlighted the plans to use ICT technology for the benefit of citizens (CyberCemetery – the archive of government websites, originally published in 2001).

OECD officially defines the e-government as "*the use of information and communication technologies, and particularly the Internet, as a tool to achieve better government*" (OECD The e-Government Imperative, 2003, p.23). While this definition is often used, it is too broad when compared to the other scholars. A significantly narrower perception of e-government was presented by Anttiroik (2007 cited in Saparniene, 2013), e-government was described as an implementation of ICT technology into online services provided by a government towards citizens.

The concept of e-governance is generally regarded to be wider with e-government as its subset. The e-governance can be defined as broader effects of ICT technologies on the two-way interaction between government represented by public servants, and the society (based on Sheridan and Riley, 2006; Anttiroik, 2007 cited in Saparniene, 2013). The e-governance can be divided into 4 main dimensions (see Sakowicz, 2003):

E-services – refers to the delivery of services towards citizens and are usually available nonstop. It can be considered as a front-end platform. The aim of e-services is to deliver citizens an easily accessible value (service) at a reasonable price.

E-administration – the back-end office of the governmental online system. To have well-working e-services, it is necessary to effectively use and transfer the information, data and electronic records between various government institutions. It might be a challenge due to its requirement of a shift from traditional communication across government agencies.

E-democracy – this dimension relates to the use of ICT technology as a framework to promote the involvement of citizens in the democracy in the country and participate in policymaking. It can be done through e-voting, various surveys, questionnaires, forums and other tools to increase general citizen participation in public affairs. It is considered as complex.

E-commerce – in the context of government, it refers to the money circulation over the internet where a government is involved not just as a regulator, but instead as a subject of trade. It usually means citizens paying for government service, but also government acting as a buyer.

Despite the fact some differences were highlighted, the general understanding of terms e-government and e-governance is not yet strictly defined and different researchers use various perspectives. In this thesis term e-government will be perceived as a sub-part of e-governance and will include mainly e-services and to some extent also e-commerce.

While hard-work to enhance all dimensions of e-governance explained in Sakowicz (2003) can clearly contribute to the quality of the modern citizen-oriented government, the focus of empirical part of this thesis will be more narrow – on the e-government; primarily on the e-services provided by the government, as they can potentially be benchmarked relatively well across countries and the comparison can explicitly show the difference. In addition, e-services appear to be the easiest aspect of e-governance to improve in a short run. For example, a satisfying information provision is closely connected to the design and navigation on the website, what can be achieved relatively simply, while on the other hand, an interactive participation of citizens on democracy through using ICT technologies might beside e-voting be more problematic.

2.2 Innovation literature and e-government

"An innovation is an idea, practice, or object perceived as new by an individual or other unit of adoption." (Rogers, 2003, p.11)

Although innovation in e-government can undoubtedly be considered as a part of the potential focus of innovation studies, there has been little attention devoted to this topic by the core of innovation scholars and it is currently an under-theorized concept. To put it into the context, innovation in e-government brings a novelty in methods of interaction with citizens on a national level and it definitely belongs to the innovation in the public sector. Also, it is strongly connected to the technology adoption, as the rate of acceptance by general public

determines its success and benefits. Considering the effects it might have on citizen– saving many hours of bureaucracy every year, it is very surprising that no systematic focus, which the e-government deserves, has been given to the topic by the main innovation scholars.

To understand this, a review of innovation literature focus might provide a deeper picture. A rather negative reflection on the core innovation research was given by Martin (2013). The discussion pointed to the extensive studies on product innovation, and especially radical innovations, while incremental and some other types of innovation tend to be ignored by scholars. The argument was built on the "invisibility" of some innovations – for example, in design and software, which usually are done outside the Research and Development and often neither the number of patents issued can reveal it. His arguments seem to reflect well why some innovation-related concepts tend to be under-theorized. As I pointed out in the introduction, the amount of money invested in e-government might not be perfectly correlated with its quality, what seems to be an unfortunate case for Slovakia. Therefore, the measurement of more relevant factors in some innovations – design, software, and user-centric focus is needed to be studied to review the progress in some specific fields of innovation. In spite of efforts of innovation scholars to implement more relevant measurement tools in their research – to use Community Innovation Surveys, these efforts cannot be applied to e-government. For example, the Community Innovation Surveys were not designed to be used for public sector and even, in general, innovation in services is not yet well addressed (see Oslo Manual, by Mortensen and Bloch, 2005; also in Smith, 2005).

Another idea of a potential danger in a progress of innovation studies, as not yet dynamic-enough and broad-enough science was presented by Fagerberg et al (2013) when they summarized the evolution and challenges of innovation studies. The presented perspective describes a risk that current research in innovation study will not be able to represent the recent structural changes in the form of innovation and will rather reflect past patterns. The relevance of the output for stakeholders of current innovation research was also questioned.

The innovation in e-government seems to fit into the description of a field that innovation studies forgot to study. The two recent decades of ICT progress have opened new possibilities for governments to regularly positively affect lives of their citizens. However, due to novelty, hardly calculable benefits in money terms, and the lack of a specific framework to measure it from the innovation perspective, innovation scholars ignore the topic of e-government. In addition, the effects of innovation in design and usability of newly introduced services on the adoption rate tend to be also under-theorized in innovation studies and therefore, rarely are being measured. More intense work in the field by innovation scholars would potentially bring quite well applicable suggestions for policymakers, how to reach better adoption rate and thus maximize potential benefits.

The innovation in the public sector was not a core part of innovation studies and therefore, the knowledge must be obtained from other disciplines (Fagerberg et al., 2013). On contrary,

there were several innovation scholars working on the research on technology adoption, which has a crucial importance when discussing the effects of e-government on citizens.

2.2.1 Technology adoption

Why are some innovations successful while others were not accepted? A comprehensive concept of the determinants of the diffusion rate and speed was presented by innovation scholar Hall (2005). In the further text, the mentioned concept will be applied to an innovation in e-government. According to Hall's study (2005), 5 main factors can be identified which decide whether the innovation will be adopted and how fast might it happen:

Benefits from the new technology – considered as a crucial determinant. If the newest innovation does not have a close and similar substitute, it tends to diffuse faster. In the beginning, the latest technology may not represent a significant improvement and it needs some time to be adjusted to certain user environments (see also Nelson et al, 2004). If the benefit is just incremental compared to learning costs, the adoption will not happen.

In case of e-government, the biggest benefit for citizens is to save time – in the ideal scenario, thanks to the innovation, a citizen is no longer required to visit the physical office, instead can choose to interact over the internet. However, in the beginning, this interaction might be limited to only searching for information, for example.

Effects of a network – Some technologies might require interaction with other users in order to fully reach their intended benefits. For some others, the size of customer networks decides the compatibility with other products or software quality.

Note: at the time the article was originally published (2005), social networks and the most popular instant messaging apps were non-existing (Instagram, Whatsapp, Snapchat) or at the very beginning phase (Facebook). However, these are great examples to demonstrate the power of a network in some specific innovations.

From the wider angle - in e-governance, the participation on democracy through various forums might be dependent on other users. On contrary, in the e-government perspective, the interaction with other citizens does not seem to apply significantly. However, in e-government the effects of a network might be visible on the quality of software – the more people should use the specific function, the more effort will most likely be spent on user-friendliness.

New technology adoption costs: The direct costs of purchase of new technology can be significantly lower than indirect costs – such as learning. Although difficult to measure, all costs are needed to be included in order to have more accurate prediction whether and how fast the new technology will be adopted.

Citizens using the e-government platform should not experience large acquisition costs (at the assumption they already own a device within internet coverage). However, it might be more

time demanding to learn how to use a certain e-government function compared to visiting a physical office, especially when the service is rarely used.

Available information and uncertainty: It is the role of a supplier of a new technology to provide the information on how to use the technology and what benefits it might bring. Benefits of the new innovation are usually distributed for a longer time period while costs of acquisition + learning costs occur at the beginning. If a customer does not obtain right information about how and why to use the technology, its diffusion is at a serious risk.

With the e-government technology, citizens might often face the insufficient knowledge about the potential use of some services online, due to lack of promotion of public services. In addition, especially for older individuals, there might be precise manual lacking, as these services often suppose basic knowledge of ICT technology.

Market size, industry environment, and market structure: The rate of diffusion of technology varies across industries and is also dependent on the regulatory network. The competitiveness and a number of subjects on the market are affecting the tendency to implement new innovations. Usually, the innovations produced by larger firms tend to diffuse faster.

The new technology usually requires first to be adopted by the supplier and later by its customers. From the e-government point of view, the government has a position of a monopoly without a risk of losing it. Therefore, the tendency to implement new technologies from the supplier perspective might be slower. On the other hand, the competitiveness of political parties might offset it.

Although the explained concept of determinants did not specifically deal with fast-changing short-term trends – especially in the design or functionality of ICT products (such as mobile apps), it appears to be general enough to capture this latest development as well if assessed by potential benefits and adoption costs.

2.3 Innovation in the public sector

As a result of lacking attention given to the topic by the innovation studies, it was mainly a role of public administration literature to capture the concept of innovation in public services (De Vries et al, 2014). Innovation in the public sector is similarly defined as the innovation in general. One commonly used description by Brown and Osborne (2005, p.4) summarizes the innovation as the introduction of a new element of various form into a public service, while discontinuity with the past is required. This requirement might be very problematic, as it might be impossible to determine if an incremental change - in design, for example, can be considered as innovation or not. Therefore, Rogers' (2003, p. 11) outlook might be more accurate – innovation is what is perceived as new, also in local context. Innovation has become a buzzword mainly in the context of the private sector, however, examples from the

past show that public sector has been behind some of the world most changing inventions and their adoptions, like vaccination and world wide web, just for instance (see Pollitt, 2011). However, there appears to be a natural tendency for a government not to be innovation-driven due to a risk of a failure, which might result in undesired attention to blame someone (Altshuler, 1997, cited in Pollitt, 2011), to illustrate this, I offer the failure of Concorde project as a very appropriate example.

A unique research was conducted by Danish government aiming to compare innovation rate in private and public sector (cited in Fuglsang and Pedersen, 2011). On the relatively large sample, their results show that 64% of questioned public sector organizations innovated in a 5-year period, compared to 72% rate in private sector in a similar but shorter study. Although there appears to be a lower rate of innovation in the public sector, the survey might have included some bias, as managers of private firms might have a tendency to overstate the reality - no manager wants to report the company did not innovate at all. On the other hand, some public officials might be required just to follow strictly defined rules on how to spend the budget, therefore, innovation can be in certain cases undesired. Considering arguments, the innovation rates are very similar, what seems to be in contrary to previous expectations. Is there, therefore, a significant difference between innovation in the public and private sector?

To a large extent, public sector innovations seem to follow a top-down pattern much more often than those in the private sector; however, the research showed that innovation is just as often employee-based as in the private companies (based on the Fuglsang and Pederson, 2011). The results of Danish research further revealed a significant difference between sectors – public institutions' innovation heavily comes from the political-administrative organizations (Fuglsang & Pederson, 2011). This represents a risk. In private companies, management is usually personally responsible for failure or success of specific innovation and it can be clearly seen from the company's financial and other results. However, if innovation is not market driven, and results are not that easily readable, due to lacking personal motivation the innovation may result in less significant change or no improvement at all from the perspective of receivers.

Although the innovation rate might be very similar in the public sector compared to private one, the first mentioned might be riskier due to the potential outcome, as the innovation usually needs to be carried out through more institutional units and the agency problem might arise. The meaning of agency problem in this context is that interests of some public officials, who are required to be involved in the process of implementation of new innovation in the public sector, might not be as straightforwardly oriented on the quality of results as in the private sector. For example, if their income misses a variable element, and an output quality level cannot obviously be seen, public officials might prefer to spend the least possible effort. Therefore, there is a need for a more research on how to measure the actual quality of the outcome of innovation in public services in order to strengthen the pressure on public officials to deliver the expected results.

2.4 Benefits of well-working e-government and barriers to the adoption of e-government services

Since the early 2000s, there have been several academic attempts to examine the benefits of implementation of e-government services on a national level. A new idea was presented by the research of Bretschneider et al. (2003), which differentiated among two main benefits of using e-government in the state from the perspective of government: administrative and political. While administrative aims at reducing operating costs, what based on their empirical research seems to be more reasonable to expect in large-scale implementation; political aspect is about increasing interaction with voters. Although it has been 15 years since the article was originally published, it presented reasonable concept: what appears to be the benefit of well-working e-government – increased participation of the general public, might also be the major constraint. Today, this factor might be still relevant, for example, in an implementation of electronic voting in some countries. This e-government e-service would give a very easy opportunity to vote also for citizens who for some reason decided to move abroad. Leading political parties might be under a risk if enabling these votes, as there is a generally assumed correlation between satisfaction with current government and tendency to move abroad. Therefore, what might be regarded as beneficial in general context might sometimes be in contrary to ambitions of policymakers, what is likely to slow down the process of digitalization in the public sector. Although the Bretschneider's et al. (2003) concept seems to address the institutional point of view, it lacks the benefits of e-government from the perspective of citizens.

2.4.1 The administrative benefits of e-government

A decent number of researchers examined the administrative benefits of implementing e-government in more details and found a saving potential. Huang and Bwoma (2003), on the example of actual costs of online and offline provision of car registration service in Arizona, pointed at around 75% cost reduction, even if the provision for a third party – server administrator was included. Hackney et al. (2007) focused on the Government-to-Business perspective of e-government. In the research, potential benefits of electronic auctions in public sector were examined and according to empirical findings, the implementation of online procurement might a significant step forward in gaining better value for money. Despite overall optimism, researchers note that inability to set up right conditions for specific auctions might quickly ruin potential benefits.

From an operational point of view, to obtain best results, a government should try to identify its priority services which are suitable to be digitalized – it is recommended to first focus on the large-scale services with the aim to maximize the potential user base. In order to obtain high acceptance rate and thus the associated savings, this should be done with a detailed feedback provided by the end users – citizens (based on Corydon et al., 2016).

The largest operating cost savings can a government experience if it decides to replace part of a traditional interaction with digital channels only (see Petrov et al, 2016). The report refers to the potential saving in the amount of 1.3£ billion if the UK would shift 30% of personal government-to-citizen services into online channel. A similar shift would most likely cause many controversies. The older citizens might feel discriminated if the quality of services would decrease as their ICT skills are often insufficient to use online channel. As the quality level of an online option will reach a certain point, the solution might be to shorten the opening hours for some face-to-face services or to lower the number of employees in those offices. In that case, citizens without the option to use faster channel would be able to receive almost unchanged services.

2.4.2 The benefits perceived by citizens

From the citizen perspective, authors usually point at nonstop service availability – what might be considered as a significant service quality improvement, and time savings experienced by individuals, as the most difference when compared to a traditional face-to-face interaction with governmental officials (see Huang and Bwoma, 2003; Torres et al, 2005; Alshehri, M., & Drew, S. 2010). Based on the survey in the UK, Gilbert et al. (2004) identified several benefits, which were regarded as a motivation to use e-government services. The following three potential benefits were among the most significant: time-saving, the availability and quality of provided information, and lower costs when using online service. Although the survey was conducted on the rather small sample of 111 citizens, it is one of the few studies of its kind and still relevant to the discussion.

2.4.3 The barriers to the adoption of e-government services

Recently, Petrov et al. (2016) in the World Bank report identified the current situation in e-government development and also offered few key reasons why national e-governments in most cases lag behind the citizens' expectations. While citizens expect the interaction with a government to be similarly simple as the communication with private firms, the research showed this is very distant from the reality and two-thirds of US citizens perceived the governmental websites to be worse than private ones. The idea presented by researchers suggests causes of the relatively low adoption:

A: In many cases, an e-government service does not offer substantial benefit for a citizen.

B: Online services are designed by service managers and in most cases without a user-centric focus. This results in a poor citizen experience.

C: Back-office is often not designed effectively to simplify communication across governmental bodies.

D: The failure to keep pace with recent technologies – such as a support for smartphones.

The common mistakes governments usually make in their e-government services have been also analyzed by Bertot et al. (2008) based on empirical studies. The research found that governments have a tendency to exclude citizens' opinions when designing online services. The cost saving is often the main priority while the focus on the quality lacks. In addition, these online services are rarely adjusted based on provided feedback. Also, the systematic evaluation of service output is usually missing once the service is online and working. What citizens found as a crucial problem in the survey was the lack of integration of individual e-government services.

The identified reasons accounting for worse than expected quality of e-government together with common mistakes in national e-governments appear to be justified, as are very close to the observations in Slovakia and the Czech Republic by many journalists. The aim of empirical part of the thesis is to primarily focus on points A, B and D, while point B will be tested in detail for Estonia and Slovakia in semi-structured interviews.

2.5 Innovation in the Estonian e-government

Estonian e-government can be considered as highly innovative as it often successfully experiments with new services which cannot be found in any other country at the time of the implementation (based on E-estonia, 2018; Anthes, 2015). The following sub-chapter explains the key points in the development of Estonian e-government since the 1990s. Different views on the success factors will be discussed. After reading this sub-chapter the reader should be able to understand why Estonia might potentially be a good inspiration for other economies regarding digital public services.

The liberalization from the Soviet dominance and an establishment of independent Estonian state in the early 1990s has opened the possibility for new reforms to transform Estonia into a quickly converging high-tech European market economy (Björklund, 2016). Estonia promptly introduced a complex plan for digitalization of its government with a clear aim to make a government more efficient and closer to citizen's needs (Margetts & Naumann, 2017). Although the change of regime has been one of the crucial factors enabling such an innovation in e-government in Estonia, first origins date back to 1960s – a Soviet-era when Estonia started to focus on computer programming (Roth, 2004). Therefore, in 1993, when the country introduced reforms to the state information systems (Ott, A. and I. Siil. 2003, cited in Björklund, 2016), Estonia already had a relatively prepared human capital to progress in the implementation of ICT technologies. Estonia realized that ICT offers a potential for the country to converge to the leading economies while the absence of natural resources was not a concern (Anthes, 2015).

Estonian e-government is built on layers and without previous implementation of the basic systems, the innovation potential would be very limited. The very early adoption of two key

enablers appears to be crucial for success in Estonia and it supported the creation of state of the art functionality of online e-government services (based on Margetts & Naumann, 2017).

In 2001, Estonia introduced one of the keystones in the development of its e-government – the X-Road project (E-estonia, 2018), which might be mainly considered as an administrative innovation. Its primary role is to enable an easy and secure communication & data exchange across governmental databases; however, in addition, it offers access to its features to private companies (Vassil 2016). The private sector can nowadays benefit, for example, also from an implementation of official online authentication system - eID/mobile ID or by using data from various private and public databases (Vassil 2016). The project was seen as revolutionary, what encouraged other countries like Finland years later to introduce its own version (E-estonia, 2018).

The second keystone was an introduction of digital and mobile ID verification (Margetts & Naumann, 2017; also in Kalvet, 2011). The eID was implemented as early as in 2001(E-estonia, 2018) and as today, more than 90% of citizens have actively adopted it (Margetts & Naumann, 2017). It is a crucial element for almost all e-government services in Estonia as it enables the verification of the user. In addition, it is also used for a digital signature (E-estonia, 2018) which in Estonia has by law the same general acceptance as a regular one and has recently become the preferred option (Anthes, 2015). An alternative method was introduced in 2007 – mobile ID, which provides a citizen with the same benefits in a simpler way – without the need to use a card reader (Martens, 2010). It is noteworthy, the mobile ID was implemented in a close cooperation between state and private mobile carriers, therefore, the security standards had to be set very high (based on Martens, 2010).

The reader should realize that the diffusion of home internet connection to majority of population occurred quite recently – mainly in the last 10-15 years. To show the level of advancement in Estonian e-government, bellow is the dated list of some of the technology implementation in their services in recent 20 years (gathered from E-estonia, 2018):

2000 – The first implementation of e-Tax service. Today, in 3-5 minutes, citizens can use pre-filled tax form and pay the tax. Within 2 days since filling, citizens can also expect to get back their overpayments (Tamkivi, 2014).

2005 – Estonia has become the first country to offer internet voting option in national elections. Using a simple and secure method, it only takes 3 minutes to vote.

2008 – First testing of the blockchain technology to secure the leadership in the online data protection. The Estonian know-how was also adopted by NATO, EU and other institutions.

2008 – The first use of e-Health in Estonia. As today, it also has a preventive function and 95% of generated health-related information is available online in a secure form. The citizen can access records, prescriptions, test results as well as x-ray scans. Technology includes log-files to detect who manipulated with data, for the extra layer of personal data protection.

2014 – Estonia has introduced new, still one of its kind feature - e-Residency. People from all around the world can now become active members of society in Estonia and, for example, easily start business there online (see also Republic of Estonia – e-Residency, 2018). It is estimated that Estonia's population will jump from 1.3 million to 10 million inhabitants by 2025 if e-citizens are included (Anthes, 2015).

The interesting historical perspective on the Estonian e-government might be seen in the research conducted in 2004 – the comparison of e-government progress in 10 CEE countries which were soon to become EU members, made by O'Brien & Redman. Estonia ranked as the first in almost all aspects of comparison, however, the special attention should be given to the score in the government policy and vision, where Estonia placed first with a significant lead, while Slovakia, for example, was on 9th place followed by the last Bulgaria. The interview with Arvo Ott from Estonia's Ministry of Economic Affairs (also in O'Brien & Redman, 2004) revealed the general acceptance across the whole political spectrum on the vision for e-government since the 1990s enabled such progress without many restrictions. The interview from Slovakia (O'Brien & Redman, 2004) on the other hand suggested the lack of vision for future.

The clear vision for future might have been one of the causes of Estonian e-government success. Estonia even today keeps the ambitious vision and informs the public about future aims - innovation in various sectors like education, health, and industry, with the use of latest artificial intelligence technologies (E-estonia, 2018). However, there has been a research conducted pointing at different determinants of success. Kitsing (2011) argues that Estonia never had a clear strategy on how to achieve specific goals because this would create an unnecessary layer of bureaucracy. Instead, the government defined just a very general vision in which directions it wants to improve its online services. While his point might have been valid until 2013, since then, Estonian Ministry of Economic Affairs has developed *Digital Agenda for Estonia 2020 (n.d.)*, which might be by its nature considered as a solid strategic plan. Kitsing's (2011) main argument for success in Estonia's online public services is the large participation of ambitious and influential individuals within the governmental bodies but also in the private sector, rather than some centralized efforts. This claim was supported by the paper of Kalvet (2012) who compared the Schumpeter's vision of entrepreneur (1934, cited in Kalvet, 2012) to crucial individuals in the e-government development process in Estonia. The entrepreneur is usually not only looking at the profit but also on his vision and personal dreams. The similar way, employed individuals can be driven to change the current system. On the examples of birth of internet banking in Estonia, Kalvet (2012) showed the possible benefits if enthusiastic employees are let to follow their passion.

There were also other factors affecting the overall quality of online services mentioned in the case of Estonia. The e-government efforts in Estonia would not perhaps be possible without the stable funding, which accounted for about 1% of the country's budget (Kalvet, 2012). Based on various empirical studies, success in Estonia can also be connected to a well-

developed national innovation system - the main focus of innovation scholars (Kalvet, 2012). The key actors also managed to keep a future in mind when designing e-government functionalities (Tamkivi, 2014) what might be another reason for a smooth progress.

Potential benefits of a modern e-government system depend heavily on its adoption rate and the adoption is closely related to the user-experience. As was pointed from the literature, Estonia can be regarded as a successful country in service innovation in its e-government system also in the international perspective. However, is the Estonian e-government similarly advanced from the user (citizen) perspective? Is the user-experience on a higher level compared to similar economies? To better understand the topic, the e-government user-centric quality measurement follows.

2.6 Measuring the quality of e-government from the user perspective

As was previously shown in the technology adoption section, in e-government, citizens will likely use the services if the perceived benefit will be higher than the occurred cost (including the opportunity cost of rather using an offline variant of the public service). The cost of using e-government service except for usually a negligible initial acquisition cost of a device, represents the effort needed to learn how to use it plus the actual time necessary to use the function. The major constraint is the insufficient information how to use the online service. Therefore, the user-centricity of the online service is a very important aspect, deciding whether users/citizens will adopt it. An easy to apply, and empirically verified measurement tool was developed by Papadomichelaki and Mentzas (2009) to determine the quality of e-government services from the citizen-oriented perspective. The dimensions were established on the grounds of previous findings regarding website quality, the e-government service quality, and other related literature. Authors tested the relevance of proposed dimensions and their attributes in the online survey on the sample of 630 respondents. The result of analysis suggested the significance of all dimensions on citizen's perception of quality in e-government. The empirical chapter of this thesis will be based on their output which will be used to design both quantitative and qualitative part of the research. The following text is the summary of individual dimensions from the Papadomichelaki and Mentzas (2009) work.

Ease of use: The e-government websites should be quickly accessible from the web search engines and ideally the url address should be simple to remember. Users should find the navigation on the website intuitive and clear, what might be achieved by the right composition of menus and buttons. The language used should be understandable for the average user. There should also be the option to change the official language.

The research does not specifically mention the importance of one centralized website and unified environment across different e-government portals, however, that might be caused by

its age - it was constructed back in 2009. Mentioned aspect also seems to belong to the dimension ease of use.

Content and appearance of the information: What information and services are available online? Are the information provided up-to-date, topic related and in the right amount? The e-government services should be graphically appealing to the user and offer intuitive animations.

Reliability: This dimension concerns the accessibility of e-service. Is it loading in various browsers? Does it consistently function correctly? Is the speed satisfactory? Are there any other issues affecting intended performance?

Citizen support: The e-government services should provide citizens with tools to assist them in case of troubles to complete the service or find a relevant information. Primarily, these tools should be found directly on the website, for example, FAQ or help pages. However, if additional assistance is required, there should be contact information – e-mail or telephone contact. (Note: the online chat can also be offered as a modern & fast solution)

Trust/Security: Citizens should believe that their data are secure and protected from the frauds. The adequate privacy of personal data must be guaranteed. The e-government services should use advanced verification settings and archived data are to encrypted. Security concerns can quickly spread and might prevent citizens from using the online service.

Support in completing forms: The great potential of e-government services is in saving time for its citizens by the automatic filling of the forms using information previously provided by the citizen or gathered from the internal sources.

None of the dimensions includes the option to give a feedback, although in the sub-chapter 2.4.1 its importance was previously discussed. A feedback might be considered as the power of user to affect future user-experience with e-government, therefore, it will be a part of the empirical section as well. Also, due to rapid progress in mobile phone technology in the recent decade, the aspect of mobile-friendliness appears to be reasonable to be included in the comparison.

If the proposition Estonia performs superiorly in the e-government user-experience compared to similar economies is correct, the possible explanation would be that government implemented specific policies and guidelines how to attractively design e-government services from the user perspective. The upcoming section discusses the matter.

2.7 Estonian model for designing user-centric e-government services

Estonia in the recent 7 years has published several detailed frameworks and guidelines on how to design their online services to be uniformed and to reach a high standard of usability

and citizen satisfaction. The main purpose of documents is to help to achieve high adoption rates for online services. Two of the most topic-related pdfs were also published in English.

The Framework for Self-Service Environments (2012) provides advice for individuals involved in the development of e-government services. The framework discusses the necessary back-end architecture for a standard online self-service, but also how it should appear from the perspective of the end user - citizen. The focus is given to the simple navigation right from the first page. The framework offers tens of concrete linked examples how to structure various functions and the design of service website. Therefore, if these principles are applied, the appearance and structure of different e-government services should look very similar and the user should be able to more easily adopt it. The document also provides the strategy how to make tailored cost-benefit analyses, determine citizen's desires and design services accordingly. In contrast to general findings of Petrov et al (2016) from various countries, the importance of the user's need is prioritized in this document.

The supplementary document - Usability Requirements for the Framework for Self-Service Environments (n.d.) was published to provide more details about the exact expected look of services' front-end. The document is based on the recent scientific research and describes how users tend to read the text and perceive the websites. It provides a very concrete advice on how the text should be written and structured to get the best attention. The emphasis is also given to the simplicity and providing users with no more information than necessary. Various aspects such as the type of navigation, colors, buttons, and position of menus are discussed in details and many specific, observation-based recommendations are given to each of them. The advice also concerns feedback, help, automatic filling, and multiple languages used. In addition, the document states that e-government services should be regularly tested by users in quantitative terms (time needed to complete the task) as well as and qualitative terms (user satisfaction). Due to their depth and science-based nature, recommendations seem to be applicable for private sector services as well.

As discussed, Estonia has developed a very clear, straightforward framework how to design its e-government to be citizen-friendly. If the empirical research will show their e-government performs better than similar economies in the user perspective, foreign officials might find the above-mentioned documents (and other similar ones which are currently only published in the Estonian language) very useful to assist them in increasing the user satisfaction with national e-government services.

3 Methodology and data collection

The research design is based on mixed methods approach in order to be able to evaluate all dimensions related to citizen perception of e-government quality developed by Papadomichelaki and Mentzas (2009). This section contains detailed characteristics of the research design and how data will be collected. It is divided into 2 sub-chapters, each discussing one part of mixed method approach. Both sub-chapters include the explanation why this type of research was selected, the information about data collection, and limitations of the specific method.

The main goal of the thesis is to answer the following research question:

RQ1: How is the Estonian e-government quality from the user perspective in a relative benchmark to similar European economies – such as Slovakia?

The quality recognized by citizens is strongly related to the adoption of technology and therefore, predicts the potential benefits from innovation in e-government. If Estonia greatly outperforms similar economies, its policies regarding citizen-centric approach might be used as an inspiration for lagging economies.

3.1 Quantitative analyses

The quantitative approach is used to obtain the core information about the quality of e-government services from the perspective of citizen across benchmarked countries. Based on the Papadomichelaki and Mentzas (2009) dimensions, appropriate indicators were chosen from various e-government-related rankings. The final index is presented as ECQI – E-Government Citizen-centric Quality Index. Each indicator was given its weight in the final score, based on its relative importance in the ranking.

Content and appearance of the information – Content of e-government can be measured in the quantitative perspective; however, the appearance must be gathered in qualitative research. Two indicators will be used associated with the content of the e-government services: Online Service Index and Open Data.

Online Service Index: gathered as one of the indicators from UN e-government survey 2016 (United Nations, 2016). A team of experts evaluated national e-government websites in a binary system whether it contained specific features (e-services) or not. The features had to be easily found, otherwise, no points were given. Each e-government portal was examined by at least three experts in the national language. This indicator has the largest weight in the ECQI **– 40%** as it directly expresses the functions that can be found in individual e-governments – what directly affects benefits perceived by the citizens.

Open Data – obtained from European Data Portal (2017). Data were presented in the international ranking Open Data Maturity in Europe 2017. The thesis works only with sub-index Portal Maturity, as this aspect is directly related to the citizen' experience with the use of e-government portals. The indicator consists of 3 parts: usability of the portal, re-usability of data, and spread of data. The first mentioned reveals features available on e-government portals regarding the availability of national data, and the possibility to contribute & provide feedback. The re-usability of data determines the readiness of data for the secondary use, for example, available formats or whether it can be used for machine processing. The spread of data measures the width of topics published on national portals. The weight of indicator *Open Data* in ECQI was set to be **10%** - for the average user, the availability of specific data, documents and agreements might not be needed; however, some citizens might find them very useful for various purposes; therefore, still a relevant sub-indicator to include. Furthermore, open data also stenghthen the transparency and engagement of citizens in the public sector.

Trust/Security: The citizen's willingness to use e-government services might also be affected by their trust towards the security and data protection. Although well-developed security measures might not be enough to motivate citizens to use online services more often, they are still required for the adoption of technology. The potential security concerns could spread quickly and have a negative effect on the number of users of e-government services. As the technology advances and more valuable information are online, it is reasonable to expect more threats and cyber-attacks in the future. This indicator estimates the risk of security issues to occur which might influence the trust of users. Its weight is **15%.** For the calculation, the average of two indices was used:

Global Cyber Security Index (2017) – created by International Telecommunication Union. It aims to measure the commitment of countries towards cybersecurity in five aspects: legal, technical, organizational, capacity building, and cooperation. The commitment is likely to reflect the probability of digital security issues in the future.

National Cyber Security Index (2018) – developed by E-Governance Academy Foundation, which is based in Estonia. The ranking consists of 12 indicators measuring cyber-security capacities at the national level. These indicators assess cyber-security of e-government including personal data protection; cyber-security policies and education in place; detection of potential thread; incident and crises management; and international cooperation.

In the case of Estonia and France, data for the second index were not available, therefore, only the score from GCSI have been used for those two countries.

Support in completing of forms: Data for this section were gathered from Digital Economy and Society Index by European Commission (2017; the original source of data is eGovernment benchmark 2017). The measurement *Pre-filled Forms* indicates the amount of data that are automatically pre-filled in the forms found in national e-governments. Its weight

is set to **20%** as there is a clear connection to the usability and the indicator is associated with a benefit of time-saving in a comparison to the traditional offline provision of service, where this feature is unavailable.

Mobile Friendliness: Smartphones have become widely popular, convenient devices and their usage possibilities improved significantly in recent years. Therefore, citizens might prefer to do simple tasks related to interaction with a state using their mobile device. The e-government service support for these devices, as the result, affects the usability of the services and also the user satisfaction. For this indicator, data on *Mobile Friendliness* were retrieved from the country factsheet of eGovernment benchmark 2017 (European Commission, 2017). The data in original source were obtained as binaries, whether the specific service of national e-government is adjusted for the use on a mobile device or not, and then recalculated on the scale 0-100 for the use in eGovernment benchmark. Due to an increasing influence of mobile devices on online service interface, the weight of this sub-indicator in ECQI is **15%**.

For the E-government Citizen-centric Quality Index, 7 European countries were selected:
Estonia, Slovakia, Czech Republic, Poland: a lot of similarities in the political and economic history in the last decades. All countries were affected by the Soviet dominance in the second half of 20th century and faced challenges in the process of transformation towards the market-oriented economies. Other connections can be found in the similar size of GDP per capita (The World Bank, 2018) and in the position within EU (all entered in 2004). Three other economies were selected to be able to compare Estonian performance to Western Europe.

Germany, France – two strongest economies in the continental Europe
Sweden – the largest Scandinavian economy, generally considered as one of the leaders in the digital technology.

Only 7 European countries were compared in total due to data and length restrictions and in order to keep the ranking visually clear and easy to read.

The final sub-indicators in the ECQI were calculated on the relative basis to the best-performing country from the selected sample (value 100). For example, France had the highest score in the Online Service Index (OSI), equal to 0.942; therefore, France received the value 100 in the OSI. Other scores in this specific sub-indicator were recalculated relatively to the performance of France, for instance, Slovakia with the score 0.442 received the value 46.9. The numbers were thereafter multiplied by the specific weighting.

3.1.1 Limitations

Due to data availability reasons, the aim for clarity, and the limited length of the thesis, only 7 European countries were selected in E-government Citizen-centric Quality Index. As a result of creating a composite index, there is a risk of including some additional constraints and errors found in the original data sets. Another limitation is in choosing particular indicators to represent specific dimensions. The indicators mostly related to the citizen's perception of e-

government performance were preferred. However, the selection of different data sets for individual dimensions might affect the overall results of the ranking. The weights of individual indicators are arbitrary, but appear to be reasonable, and ECQI indicator also includes the sensitivity analyses for different weighting. The largest limitation of this quantitative research is its inability to include some other dimensions related to the usability of e-government service such as ease of use, thus supplementary qualitative analysis is needed.

3.2 Qualitative analyses

The qualitative research was conducted to evaluate other dimensions from the chosen framework by comparing the experience of using two central e-government websites – Estonian and Slovakian by the general public. Slovakia was chosen for the reasons discussed in the previous sub-chapter and in the introduction. The intention was to compare other citizen-related dimensions of e-government (see sub-chapter 2.6): the ease of use; reliability; an appearance of the information; citizen support; and also an option to provide feedback.

The semi-structured interviews were done on the sample of 10 citizens, in person, and also included an experiment. The research is unique because the same sample compared e-government of two different countries. The previous survey studying the similar topic, conducted by United Nations (2016) used a small size of at least 3 experts to simulate the experience of citizen with national e-governments. The aim of their research was limited to only determine whether a website includes an information/ function or not. The qualitative research for this thesis was, however, not conducted by the experts, rather by regular potential users of various ages and explored different dimensions of quality from the user perspective.

3.2.1 The sample

The sample group consisted of 10 Slovak - nationality citizens, who speak English at least at the upper intermediate level (B2). The reason for this is following: while Estonian central e-government website offers the same functionality in the English language that is not the case of the Slovakian website, which functionality is only fully available in the Slovak language. Therefore, if the same sample is supposed to test both platforms, they need to speak both Slovak and English. The average age of participants was 34 years and varied from 21 to 55 to represent various age groups. Only respondents who did not previously used any of the central e-government portals to search for information were selected, otherwise, respondents would be more experienced with one of the portals, what could affect the results.

3.2.2 Testing

At the beginning of the interviews, interviewees were asked to perform a testing of central e-government websites of Estonia and Slovakia (eesti.ee and slovensko.sk). In 5 cases

interviewees started with Estonian website, in the rest Slovakian was used as the first portal, as there might have been a tendency to remember more details about the latter portal.

The task for interviewees was to search for information regarding 5 different life events. It is important to note that these 5 life events were selected by the administrator prior working with any of the e-government platforms; otherwise, it would be easy to select life events tailor-made for one of the portals. Life events represent a simulation of common issues that citizen might be looking at the website under various life circumstances:

1. You have lost the national ID document; what steps should you take next?
2. You are planning to study at the university. What kind of financial aid does the government offer?
3. How does the government financially support parental leave?
4. What are citizen's rights if he/she purchased goods from internet website?
5. You are planning to change a permanent residence, what are you required to do?

Before the testing, respondents were supposed to read all instructions and main questions for the following interview and were asked if they understood. They were provided with extra papers and pen to note they experience while searching portals. No advice regarding e-government websites was given during the testing. At the end of the testing, the respondents were provided with 5 additional minutes to browse both of the websites without specific instructions. The length of the testing was not specified prior to testing, however, the interviewees were supposed to skip to next question if they could not find a relevant answer after a couple of minutes. Respondents usually have spent about 50 minutes working with portals. The formulation of instructions for interviewees and the list of interviewees are available in the appendix A and B in English.

3.2.3 The interview

After conducting the testing, respondents were interviewed, each individually. The questions were asked after the testing, in the Slovak language and separately for each country. The questions were supplemented by the additional investigation, based on the responses. In the case of questions for the second tested portal, interviewees were also asked to relate the result to the first portal. The following were main questions:

1. What browser did you use? Were all pages loading quickly and correctly?
2. Did you manage to find all searched information online?
3. Do you think the information was given in the right amount?
4. Did you consider the information given as easy to understand?
5. Could you find looking information relatively quickly?
6. Were you often redirected to another portal?
7. Were navigation, menus, and buttons on the websites intuitive to use?
8. Was it easy to find contact or additional support?
9. Were you able to find "give a feedback" option?
10. How did you like the design of the websites?
11. What improvements would you recommend?

12. Would you like to add anything else? Which portal would you prefer as a citizen?

The interviews were recorded and lasted approximately 70 minutes including the testing. The responses were then typed and processed. In order to be able to compare e-government websites based on answers, responses were summarized into dimensions regarding citizens' perception of the quality in e-government (see the page 15). The results are presented in the next chapter. The transcript of all ten interviews is available in the Slovak language upon request.

3.2.4 Limitations

The study is only limited to the citizen experience regarding information search on the online e-government websites, and it is only done for two countries – Estonia and Slovakia. The additional e-government services cannot be tested in this study, (for example paying taxes online, searching for medical records etc.) as the sample group does not have access to log into the Estonian portal – Estonian citizenship would be required. Although this limitation is significant, provided outputs are still relevant, as citizens often search for various information regarding their life situation on the internet, without the need to use some specific e-government e-service. The usability of portals to gather information might also to a large extent suggest the usability of other services within national e-governments.

The additional limitation is that 5 chosen simulated scenarios might not sufficiently represent the citizen experience with searching information. However, the scenarios were chosen in a variety of life events and by the critical judgment, they appear likely to be common.

Furthermore, English is a foreign language for the tested sample; therefore, working with the Estonian portal might have been naturally more challenging.

4 Results and discussion

This chapter presents and discusses the results of empirical research of the thesis. The chapter is structured into 3 sections. The results of quantitative and qualitative analyses are introduced to the readers separately and are followed by the joint discussion.

4.1 Quantitative analyses

The E-government Citizen-centric Quality Index (ECQI) represents the overall quantitative comparison of the quality of e-government from the citizens' perspective based on dimensions created by Papadomichelaki and Mentzas (2009), among selected European countries. Only dimensions that could be described by currently available e-government indicators are expressed in this quantitative analysis. These dimensions are *Content; Support in completing forms; Trust/Security*; and one additional aspect related to the *Ease of use: Mobile Friendliness* - due to its growing importance.

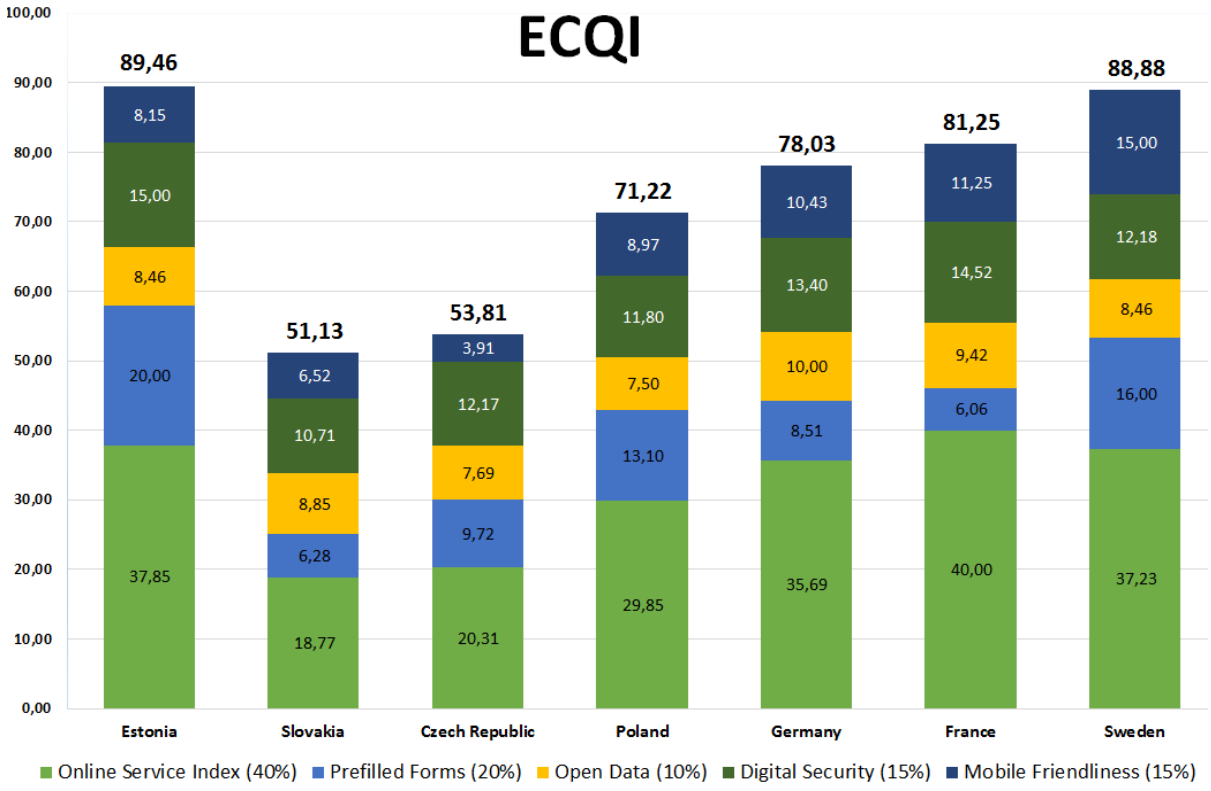
Figure 1 summarizes the results of a comparison. The potential maximal score in the ECQI composite index is 100, which is reached if one country performed better than other 6 countries in all five sub-indicators. It is valuable to mainly compare results of Estonia to Slovakia, Czech Republic, and Poland because as was shown before, these economies display many similarities. As illustrated in figure 1, Estonia reached a significantly better score in the composite index than any of these three countries.

Estonia's overall score in the ECQI is 89.46, what makes it the leader in the sample group of countries. Compared to Slovakia (the lowest score, 51.13) and Czech Republic (the second lowest score, 53.81), the most significant difference is in sub-indicators Online Service Index (which weight is set to 40%) and Prefilled Forms (its weight is 20%). The first mentioned sub-indicator reveals the availability of various services on the e-government platform. The more functions for citizens does the national e-government offer, the higher is the score. While Estonia in this aspect obtained score 37.85 (the second highest, after France), Slovakia and the Czech Republic only reached 18.77 and 20.31 points. This suggests a very large difference in the feature content of national e-governments. Poland scored 29.85, and although far from Estonia, a significantly better result than Slovakia or the Czech Republic. Together with Open Data, Online Service Index indicates the *content* of national e-government. If adjusted for Open Data score, Estonia ranks second in this dimension, just below France and followed by Sweden.

The similar picture among Estonia and three economies from the Visegrád Group can be seen in the sub-indicator Prefilled Forms, which represents the dimension *support in completing forms*. Estonia leads this aspect with 20 points; Slovakia scored 6.28, the Czech Republic 9.72

and Poland 13.10. Therefore, citizens can find the e-government services in Estonia to be more convenient to use as the benefit of autofill of forms is the largest in Estonia. Interestingly, France and Germany underperformed in this aspect and only scored 6.06 and 8.51 points respectively. On the other hand, Sweden performed very consistently and scored 16.00 points in this sub-indicator.

Figure 1: E-government Citizen-centric Quality Index (composite index)



Source: Author's own composition, based on data sources: UN e-government survey 2016; DESI 2017; Open Data Maturity in Europe 2017; Global Cyber Security Index 2018; National Cyber Security Index 2018; eGovernment Benchmark 2017.

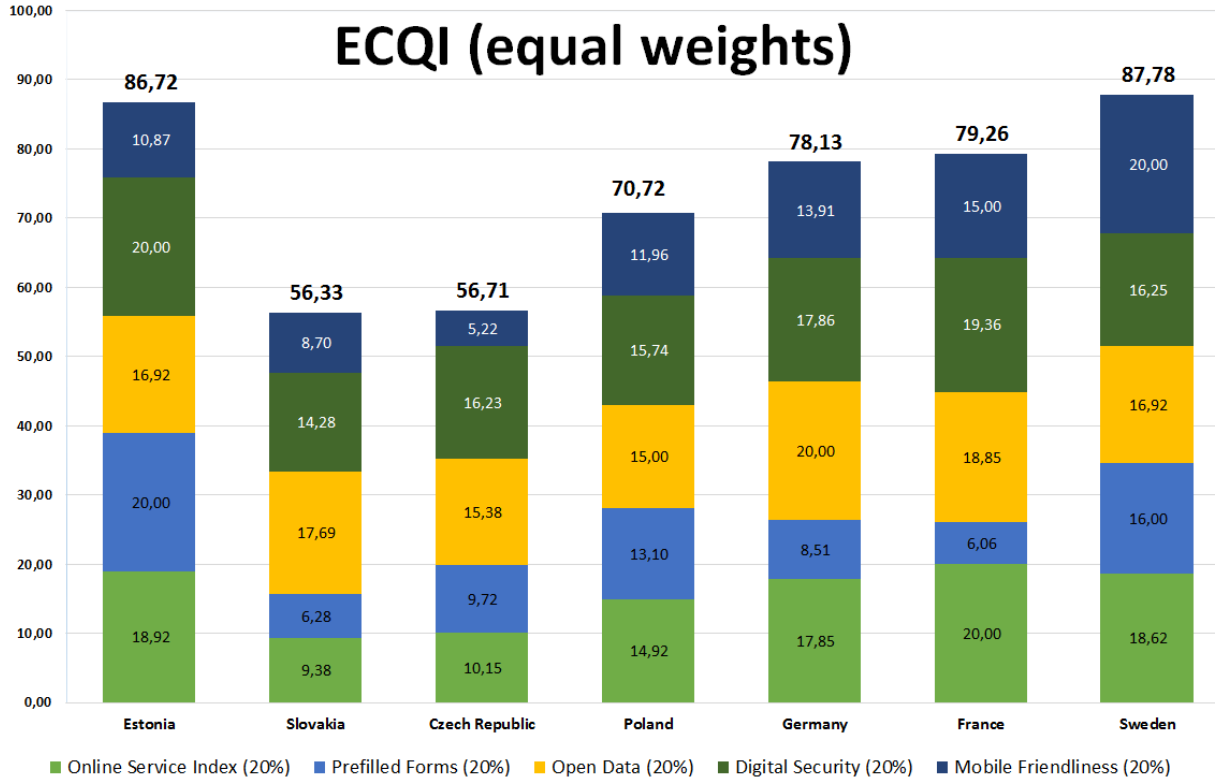
Estonia also reached the best score in the sub-indicator Digital Security, therefore it is the leader in the *Trust/Security* dimension, followed by France and Sweden; however, the result for Mobile Friendliness (part of the *ease of use*) in Estonia was under average and the country only outperformed Slovakia and the Czech Republic.

In overall, Estonia obtained the best composite score in the E-government Citizen-centric Quality Index, which represented various quantitatively comparable dimensions affecting citizens' perception of the quality of e-government. This is very phenomenal, as Estonia is the smallest economy in the comparison.

In the ECQI indicator, the third place was attained by France with a maximal score for Online Service Index. France is followed by Germany, which leads in the Open Data but mainly lagged in Prefilled Forms sub-indicator. Poland in the fifth place reached high scores mainly in the quality of Prefilled Forms and Online Service Index. The last two countries in this

composite index are Slovakia and the Czech Republic, which lagged behind the leaders significantly in the all examined aspects.

Figure 2: ECQI sensitivity analysis (equal 20% weight of all sub-indicators)



Source: Author's own composition, based on data sources: UN e-government survey 2016; DESI 2017; Open Data Maturity in Europe 2017; Global Cyber Security Index 2018; National Cyber Security Index 2018; eGovernment Benchmark 2017.

To test the sensibility of ECQI index, figure 2 is presented and the weight of all sub-indicators is set to 20%. Sweden under these conditions slightly outperformed Estonia mainly because of its leading mobile friendliness. Furthermore, German score is now closer to the values of France. Despite small differences, the sensibility analysis does not indicate any substantial risks associated with the chosen weighting as the difference in the score of Sweden and Estonia is modest and other positions remained the same.

4.2 Qualitative analyses

The results are presented based on interviews conducted immediately after testing of both portals by the sample group. Findings are shown regarding dimensions affecting citizen's perception of quality in e-government (work of Papadomichelaki and Mentzas, 2009). The evaluation of individual dimensions is done by assessing answers to related questions. Under the category *other aspects*, additional observations of ten respondents and the author are revealed. These are also related to a specific dimension, but not connected to any other question. The motive to present results in the form of tables is twofold: to show the quality of Estonian e-government in various aspects by discussing the experience of potential users and to verify the significance of findings by the direct comparison to central e-government portal in a similar European economy – Slovakia. The qualitative analysis is the supplement to quantitative results, which could not cover all assessed dimensions. The answers from interviews were processed into scorecards. If a respondent suggested a better performance of one country in the specific question, the country received 2 points, while the other one zero. Both countries received 1 point in case respondent had suggested the same quality in the aspect. The total score presents a quantitative result of the comparison for each dimension.

Table 1: Reliability comparison of the central e-government websites.

Reliability
All comparisons are made for Estonia (eesti.ee) and Slovakia (slovensko.sk)
1. Were all pages loading quickly and correctly?
Interviewees used various browsers for both portals (3x Safari, 4x Chrome, 3x Firefox). Their experience was consistent across all browsers. In case of Estonian central e-government portal eesti.ee, nine interviewees claimed it was loading pages quickly. In one instance, respondent could not determine the loading speed due to an unstable internet connection in the area where the interview was conducted. The same is true about the speed for Slovakian portal slovensko.sk. However, while there was no claim that Slovak portal would load pages faster; two respondents said the Estonian websites had a faster response. The suggestion was made, it might have been due to the fact, Estonian portal is working mainly on one domain, while in case of Slovakia, the user is often redirected to various websites of ministries, which load relatively slowly. In the functionality aspect, Estonian e-government portal performed very well. No claim was made regarding malfunctioning website, while on slovensko.sk several interviewees claimed (5), there was a problem with loading of at least one page, or even more than one (2 claims). However, there was a minor issue in case of Estonian website with its search engine in the English language. It took about 8 seconds to load the results, while no hint was given that the page was still loading. Therefore, several respondents considered it as not working and used menus and regular navigation instead. This was not the problem for

the Estonian version of the website. In the future, it can be easily solved by some simple animation suggesting the page is loading.

Reliability scorecard

Better performance = 2 points; Equal = 1 point; Inferior = 0

R = respondent	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	Sum
Question 1: Estonia	2	1	2	2	1	1	1	2	1	1	***14***
Question 1: Slovakia	0	1	0	0	1	1	1	0	1	1	***6***

Source: Author's analysis of interviews

Table 2: Comparison of content and appearance on the central e-government websites.

Content and appearance of the information

1. Did you manage to find all searched information online?

In 9 out of 10 cases, interviewees claimed they managed to find relevant information to all 5 questions on eesti.ee, while the same was true only in one case for slovensko.sk. Users usually did not succeed in finding the answer to question 4 (regarding customer protection) in case of Slovakia; however, also others were sometimes not found, for example, financial aid for studies; what to do if a person lost non-electronic ID card; or more specific information regarding parental leave. On the Estonian portal, the one case when an interviewee did not find all answers was about changing permanent residence. In that case, the search engine appeared not to work in English and an interviewee could not relate residence to housing category. In overall, Estonian portal outperformed Slovakian significantly in this category.

2. Do you think the information was given in the right amount?

While all ten testers liked the amount of information provided on the Estonian websites, only 3 of them were satisfied with the quantity on the Slovakian websites. Two types of complaints were often expressed: Firstly, slovensko.sk offered too many irrelevant choices and information that most of the users do not need; therefore it was very difficult to find what a user was searching for. Secondly, there was a lack of detailed information on specific topics. In case of Estonia, respondents praised e-government websites for their relevance of the information and prioritizing the most searched topics. In addition, compliments were given to the ability to find needed information in one place.

3. How did you like the design of the websites?

Three out of four female respondents were sure, which design they liked more and found Estonian design to be more appealing compared to Slovakian. These respondents mentioned more harmonic colors and positive feeling when searching the website. Out of remaining 6 male responses, three preferred Estonian, one Slovakian, one could not decide and one interviewee did not like either of them. In total, 6 respondents specifically preferred Estonian design over Slovakian. However, as much as 9 out of 10 suggested

they liked the design of the Estonian portal. In case of slovensko.sk, a comment was presented suggesting that although the design on slovensko.sk was quite okay; a user is almost always redirected to the websites of various ministries, which are not graphically appealing. On the Estonian portal, users found the design to be simple, but appropriate for its use. The praise was made for well-designed logos.

Content and appearance of the information scorecard

Better performance = 2 points; Equal = 1 point; Inferior = 0

R = respondent	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	Sum
Question 1: Estonia	2	2	2	2	2	2	0	2	2	2	***18***
Question 1: Slovakia	0	0	0	0	0	0	2	0	0	0	***2***
Question 2: Estonia	2	2	2	2	1	2	1	2	1	2	***17***
Question 2: Slovakia	0	0	0	0	1	0	1	0	1	0	***3***
Question 3: Estonia	1	2	2	2	2	0	2	1	1	2	***15***
Question 3: Slovakia	1	0	0	0	0	2	0	1	1	0	***5***
Total score	**Estonia: *50***						**Slovakia: *10***				

Source: Author's analysis of interviews

Table 3: Ease of use comparison on the central e-government websites

Ease of use

1. Could you find looking information relatively quickly?

In the case of Estonian portal, 9 out of 10 interviewees claimed they managed to find available information relatively quickly, while on slovensko.sk only 6 people. In the direct comparison, 5 testers managed to find information faster on the Estonian websites, in four cases respondents were not able to tell the difference, and in one case the user managed to do tasks more quickly on the Slovakian central website and praised slovensko.sk for its simple search engine.

2. Did you consider provided information to be easy to understand?

This area showed a very significant difference. Although for all users was English their foreign language, all ten of them claimed that provided information on the Estonian portal was easy to understand. For the comparison, only four people claimed the same concerning the Slovakian. For Estonia, interviewees suggested that information was given from the citizen's perspective so he/she can understand what is the most important to know.

3. Were navigation, menus, and buttons on the websites intuitive to use?

All interviewees praised the intuitiveness of portal eesti.ee. On the Slovakian portal slovensko.sk, half of the respondents mentioned the lacking sub-categories on the main page as a big disadvantage. While respondents suggested multiple times that the first

impression from the slovensko.sk is not bad, the issue becomes obvious when a user searches for information in the main categories. The sub-list of options was usually lacking any logic.

4. Were you often redirected to another portal?

Responses from the interview suggested a better performance of Estonia also in this aspect. Testers claimed they were redirected to other portals in the significantly smaller number of instances and only regarding detailed information, which was not necessarily required for primary questions. The Slovakian portal slovensko.sk very often redirected users to websites of various ministries; the exception was in the question regarding parental leave, which could be found directly on slovensko.sk. It appears that eesti.ee works as a major governmental portal, while in Slovakia; slovensko.sk is more intended as a website providing access to needed links and some e-services.

Other aspects

Estonian portal was fully available in the English and Russian language, while slovensko.sk contained a very limited amount of information translated into English. Furthermore, as was pointed by one of the respondents, eesti offered more accessibility options such as change of the text size or to switch the contrast. On contrary, slovensko.sk only offered the option to slightly adjust the contrast what users considered ridiculous. Both e-government portals use a simple to remember url address.

Ease of use scorecard

Better performance = 2 points; Equal = 1 point; Inferior = 0

R = respondent	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	Sum
Question 1: Estonia	2	1	2	2	1	2	0	1	1	2	***14***
Question 1: Slovakia	0	1	0	0	1	0	2	1	1	0	***6***
Question 2: Estonia	2	2	2	2	1	2	2	2	1	2	***18***
Question 2: Slovakia	0	0	0	0	1	0	0	0	1	0	***2***
Question 3: Estonia	1	2	2	2	2	1	2	2	2	2	***18***
Question 3: Slovakia	1	0	0	0	0	1	0	0	0	0	***2***
Question 4: Estonia	2	2	2	2	2	2	0	2	1	2	***17***
Question 4: Slovakia	0	0	0	0	0	0	2	0	1	0	***3***
Total score	**Estonia: *67***						**Slovakia: *13***				

Source: Author's analysis of interviews

Table 4: Comparison of citizen support on the central e-government websites

Citizen support

1. Was it easy to find contact or additional support?

According to responses, Estonian portal contained contact information in almost every text while searching for specific answers (the exception was question 5). Slovakian, on the other hand, did not offer much support regarding individual topics and rather provided users with a one general telephone number placed directly on the website slovensko.sk. However, a concern was made by respondent whether the general contact can be helpful for specific topics. In overall, interviewees more often claimed they could easily find a contact at the Estonian portal. A suggestion was made for both websites that online chat would be a great help from citizens' perspective.

2. Were you able to find "give a feedback" option?

Eesti.ee offered the option to provide feedback whether given information was helpful or not on every page. However, few respondents did not realize this because it was not their main focus and the feedback option was placed at a very bottom of the pages.

In addition, a feedback survey appeared directly on the website eesti.ee to some interviewees. On the website, it was also possible to send an e-mail with comments. On the slovenko.sk respondents found an option to report a problem or to fill in a contact form after log-in. A convenience of this kind of feedback was questioned by respondents. This form of feedback does not appear to be very smart either from the perspective of the administrator as it does not provide sufficient data about which page requires an update. Considering all answers, Estonian portal outperformed Slovakian also in this category.

Citizen support scorecard

Better performance = 2 points; Equal = 1 point; Inferior = 0

R = respondent	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	**Sum**
Question 1: Estonia	1	2	2	2	2	2	2	2	0	2	***17***
Question 1: Slovakia	1	0	0	0	0	0	0	0	2	0	***3***
Question 2: Estonia	2	2	2	1	2	2	2	1	1	2	***17***
Question 2: Slovakia	0	0	0	1	0	0	0	1	1	0	***3***
Total score	**Estonia: *34***						**Slovakia: *6***				

Source: Author's analysis of interviews

In only 5 out of 100 cases in total, respondents suggested a better performance of Slovakian portal slovensko.sk in some specific aspect. As a last question in the interview, respondents were to choose which e-government portal they would prefer to use as citizens. One of the respondents could not choose. However, in all other 9 instances, Estonia was selected.

4.3 Discussion

Estonia performed very well in the citizen-centric quality of their e-government. In the new composite index - ECQI, it outperformed all six other European economies and ranked first. In the previous international comparisons, where various other aspects not directly affecting citizens' experience were also evaluated, Estonia ranked behind Sweden (DESI 2017), and in some cases also behind France (UN E-Government Survey 2016). The best result in the ECQI indicator was mainly achieved by the very good performance in the dimensions of *content, trust/security*, and *pre-filled forms*. Although the comparison to Sweden was very tight and sensitive to selected weighting, the Estonian result is phenomenal considering the size and economic history of this Baltic country. If compared to three similar economies from the Visegrád Group (V4) the significant difference is evident as e-governments of Slovakia and the Czech Republic lagged considerably. The findings remained the same even if tested for sensibility with equal weights.

In the supplementary qualitative research, also other dimensions of citizen-centric e-government quality supported the previous excellent results of Estonia in the ECQI indicator. Based on the results of interviews, Estonia performed consistently well in all evaluated dimensions, and in the direct comparison to Slovakia, respondents were by a large difference more satisfied with their experience on Estonian portal eesti.ee. Nine of ten testers were sure they would prefer to use the Estonian portal. Results in quantitative terms were presented in scorecards and Estonia reached better performance in the every evaluated dimension.

The national e-governments deserve an attention of innovation scholars as are changing the interaction between state and citizens enormously. The well-working e-government is associated with many benefits both from the perspective of government and citizens. The previously discussed studies in part 2.4 suggested significant operational cost reduction and even greater potential for savings if an online service replaces the traditional offline provision. Moreover, citizens can expect the quality of public services to increase if provided online. The innovation in national e-governments has a twofold potential to positively affect lives of citizens – in the direct form, but also by the administrative savings which might be transferred to other sectors or the tax burden might be lowered.

The additional reason for even closer research and thus the pressure on public officials is the fact the innovation in e-government belongs to the innovation in the public sector. As was discussed in the sub-chapter 2.3, innovation in the public sector is more exposed to the risk as it needs to go through more channels and face various interests before it is implemented. The personal responsibility is likely to be lower than in the case of the private sector. Previous research in the section 2.4.3 indicates that one of the reasons why e-government online public services lag behind the quality of private sector is its lack of focus on citizens' needs.

As was shown in the theoretical part of the thesis when reviewing work of Hall (2005), adoption of new technology depends also heavily on the benefits from the new technology,

the volume of required learning costs, and on the availability of information about how to use the technology. When considering innovation in national e-governments, all these factors are closely connected to the citizen-centric quality - the research focus of the thesis. The perceived benefit is higher if national portals have the desired content. In addition, if e-government portals are easy to use, citizens are likely to experience smaller learning costs. Furthermore, if the citizen support is on the high level, the availability of the information how to use certain functions is greater. Therefore, exceptional performance in the citizen-centric approach should suggest high adoption rate for e-government services. To test this claim on Estonia, the DESI (2017) ranking in the sub-indicator 5a1 – *eGovernment users* might be appropriate to use. The sub-indicator reveals the share of individuals who have sent filled forms to public authorities over the internet within previous 12 months. Estonia ranked first among all 28 EU countries. To compare also with some countries from ECQI indicator, Sweden finished 7th and France 6th. On the other hand, the Czech Republic ranked 26th and Slovakia 24th. These results suggest an empirical relationship between the adoption rate and the level of citizen-centric approach in national e-governments. The focus on citizen's perception of quality in e-government might thus help to increase the adoption rate.

Estonia had a very similar starting point as other Central and Eastern European countries after the end of the Soviet era. As a consequence of changes in policies and educational system as well as because of the effort of many individuals, it currently achieves very promising results in the ICT sector. Estonia reaches high-level of innovation in their e-government and offers revolutionary features also in the international perspective. The results of the empirical research suggest Estonia can be used as a very appropriate role model in building a well-working citizen-centric e-government for lagging countries which struggle with low adoption rates. The Estonian government has published various frameworks to help public officials design public online services according to the needs of the citizens. These documents are available online in English and might provide great instructions for aspiring countries and implementation of their ideas should be the first step in enhancing the citizen-centric focus.

The outcome of the thesis can also be regarded as a message addressed to public officials in Slovakia whose responsibility is the development of the national e-government services. In both quantitative and qualitative benchmarks, the country showed significantly inferior performance in the citizen-centric approach and therefore, changes are desired in national e-government strategies. The positive outlook might be seen as several days prior to the submission of the thesis the Slovakian government published a framework for a unified design of their e-government services (Fraňo, 2018). However, these principles are yet to be implemented in the future.

5 Conclusion

The electronic government is a relatively young term, with only two decades of history during which possibilities in online provision of public services improved rapidly. The innovation in e-government can be regarded as a process of improving convenient online interaction with citizens as the progress in ICT technology opens new opportunities. The previous studies have shown various benefits that might arise both from citizens' and administrative perspective if a country designs well its online services. Although the empirical evidence suggests there is no significant difference in the amount of innovation produced by the public sector compared to the private one, the implementation in the public sector is associated with more risks. One of the substantial risks is that a government will fail to design services to address citizens' needs and usability requirements. The concept of e-government is currently under-theorized from the perspective of core innovation literature, which might not have adapted to new structural changes in the 21st century. Its focus still mainly remains on the private sector product innovation which might be more easily explored by currently established measurement tools. However, benefits to stakeholders from these studies might be questioned. The thesis, therefore, suggests one of the paths the innovation scholars might undertake in the future in order for innovation studies to stay a dynamic field of study.

5.1 Research goal and objectives

In recent years, numerous articles have pointed at the low value for money gained from e-government investments in both Slovakia and the Czech Republic. The focus of articles was mainly on the quality perceived by citizens, who are still suffering from unnecessary bureaucracy when interacting with governments. The poor citizen-centric focus when designing online platforms might be one of the core reasons why these countries suffer from low adoption rates and therefore, are unable to fully benefit from the innovation in national e-governments. In the articles, the small Baltic country with a similar recent economic history – Estonia was often mentioned as a considerably better innovator in e-government.

The aim of the Master's thesis was to determine whether Estonia has a highly citizen-centric e-government in a relative benchmark to similar European Economies – such as Slovakia. Should Estonia be used as a role model in this aspect or are the promising results in previous international rankings caused by some other factors not directly affecting the experience of citizens?

Estonia has introduced unique online services in the recent decade and also revealed a comprehensive framework that should ensure the unified design, reliable functionality and excellent usability of e-government services. The core documents are published in English

and might potentially serve as a great direct inspiration for lagging countries in case of positive results of the research.

The research design was motivated by the work of Papadomichelaki and Mentzas (2009), which identified multiple dimensions affecting the citizens' satisfaction with e-government. Since their research is 9 years old, these dimensions were slightly adjusted based on modern trends. The Estonian e-government was then assessed according to mentioned dimensions. To evaluate all of them, the research used mixed method approach.

The quantitative part of the research covered dimensions which were in some form already internationally assessed in the last two years for 7 European economies. In most cases, data were available as sub-indexes in various e-government rankings. The numbers were recalculated and weighted by their relative importance to be able to construct one composite index - E-government Citizen-centric Quality Index, which directly compared the performance of selected countries. Because not all dimensions could be covered by the quantitative research, it was supplemented by the qualitative approach. The sample group tested Estonian central e-government portal eesti.ee in the information search related to various life events. For the comparison, the Slovak portal slovensko.sk was tested under the same conditions. In the following interviews, the respondents were asked to evaluate various aspects concerning the user's perception of quality in e-government.

5.2 Results and limitations

Estonia performed remarkably well in both quantitative and qualitative comparison of the citizen-centric quality of national e-governments. In the ECQI index, it reached the overall score of 89.46 what placed it on the lead of the benchmark. In the index, Estonia outperformed Sweden (88.88) and France (81.25), countries which ranked better in previous general e-government comparisons. On the other tail of the ranking, Slovakia (51.13) and Czech Republic (53.81) significantly lagged behind the performance of the leaders.

The excellent quality of Estonian e-government from the users' perspective was also supported by the testing of national e-government portals by potential users. The results of interviews with ten testers have demonstrated the overall satisfaction in all dimensions regarding citizen-centric quality. In the direct comparison to another national e-government portal of the similar European economy – slovensko.sk, Estonia performed significantly better in all assessed aspects. The Estonian central e-government website eesti.ee provides a well-designed, unified, and intuitive environment with information prioritized and written according to users' expectations. At the end of the testing, in 9 out of 10 instances, interviewees suggested their preference to use Estonian portal rather than Slovakian.

The results suggest that Estonia can be considered a success story in building user-friendly e-government services. The governmental policies, educational paths, and detailed frameworks for designing their e-government to be highly citizen-centric might serve as a great inspiration

to other economies. Primarily, in order to reach the possible benefits from the innovation in national e-government, similar strategies should be implemented in countries that are facing low adoption rates and negative public opinions in their e-government systems. The introduction of design standards and its implementation into national online public services should be the first step to enhance the citizens' perception of quality in a national e-government.

Regarding limitations of the thesis, the quantitative research only benchmarked 7 selected European economies and was only able to compare certain dimensions of citizen-centric quality of e-government and thus the qualitative supplement was needed. The most significant limitation of the qualitative research is its capacity to solely compare the users' perception of quality when searching for information on national e-government websites under different life circumstances. The experience with various e-services could not be tested due to missing authentication tools by the sample group. However, citizens are likely to search for government-related information online and therefore, the testing is still relevant. In addition, the results of qualitative testing might provide an appropriate indication of how countries would perform also in e-service comparison as these services are implemented within national e-government portals. The interviewees could only evaluate two national portals due to limited resources.

5.3 Further research

In the future, the further research should focus on measuring the usability performance of e-government services across various countries. Many aspects related to citizens' perception of quality might be improved at relatively low additional costs. Therefore, showing the leading examples might create the needed pressure on governmental officials of lagging countries to follow the same patterns. From the perspective of the core innovation literature, any research regarding the electronic government and its effects on society is desired.

References

Anthes, G. (2015). Estonia: a model for e-government. *Communications of the ACM*, vol.*58*, no.6, pp.18-20

Alshehri, M., & Drew, S. (2010). Implementation of e-government: advantages and challenges. In *International Association for Scientific Knowledge (IASK)*, pp.79-86

Bertot, J. C., Jaeger, P. T., & McClure, C. R. (2008). Citizen-centered e-government services: benefits, costs, and research needs. In *Proceedings of the 2008 international conference on Digital government research.* Digital Government Society of North America, pp.137-142

Björklund, F. (2016). E-government and moral citizenship: The case of Estonia. *Citizenship studies*, vol. *20, no. 6-7*, pp.914-931

Buchláková, L. (2017). Slovensko 10 rokov rozbieha eGovernment. [10 years have passed and Slovakia is still waiting for its e-government boost.] *Pravda.sk,* 2 June 2017, Available Online: https://spravy.pravda.sk/ekonomika/clanok/431365-slovensko-desat-rokov-rozbieha-egovernment/ [Accessed 30 March 2018]

Bretschneider, S., Gant, J., & Ahn, M. (2003). A general model of e-government service adoption: Empirical exploration. In *Public Management Research Conference*, Georgetown Public Policy Institute Washington, DC

Brown, K., & Osborne, S. P. (2012). Managing change and innovation in public service organizations. Routledge.

Corydon, B., Ganesan, V., & Lundqvist, M. (2016). Digital by default: A guide to transforming government. New York: McKinsey & Company.

CyberCemetery. (n.d.). Electronic Government. Available Online: https://govinfo.library.unt.edu/npr/initiati/it/index.html [Accessed 7 April 2018]

De Vries, H.A., Bekkers, V.J.J.M., Tummers, L.G. (2014). Innovation in the Public Sector: A Systematic Review and Future Research Agenda. Speyer: EGPA conference.

E-estonia. (2018). We have built a digital society and so can you. Available Online: https://e-estonia.com [Accessed 18 April 2018]

E-Governance Academy Foundation. (2018). National Cyber Security Index. Available Online: http://ncsi.ega.ee/ncsi-index/ [Accessed 29 April 2018]

European Commission. (2017). Digital Economy and Society Index. [pdf] Available Online: http://ec.europa.eu/newsroom/document.cfm?doc_id=43048 [Accessed 3 April 2018]

European Commission. (2017). DESI by components. Available Online: https://digital-agenda-data.eu/charts/desi-components [Accessed 30 April 2018]

European Commission. (2017). eGovernment Benchmark 2017. Taking stock of user-centric design and delivery of digital public services in Europe. Country Fact Sheet [pdf] Available Online: http://ec.europa.eu/newsroom/dae/document.cfm?doc_id=48586 [Accessed 3 April 2018]

European Data Portal. (2017). Open Data Maturity in Europe 2017. Available Online: https://www.europeandataportal.eu/sites/default/files/edp_landscaping_insight_report_n3_2017.pdf [Accessed 23 May 2018]

Fagerberg, J., Martin, B. R., & Andersen, E. S. (eds.). (2013). *Innovation studies: evolution and future challenges*. OUP Oxford.

Field, T. (Ed.). (2003). OECD e-government studies the e-government imperative. OECD Publishing.

Fraňo, D. (2018). Jednotný dizajn manuál elektronických služieb verejnej správy. [Framework for unified design of electronic services in the public sector]. *Informatizacia.sk* 16 May, Available Online: http://www.informatizacia.sk/jednotny-dizajn-manual-elektronickych-sluzieb-verejnej-spravy/26784c [Accessed 20 May 2018]

Fuglsang, L., & Pedersen, J. S. (2011). How Common Is Public Sector Innovation and How Similar Is It to Private Sector Innovation?. In *Innovation in the Public Sector*, Palgrave Macmillan, London, pp.44-60

Gilbert, D., Balestrini, P., & Littleboy, D. (2004). Barriers and benefits in the adoption of e-government. *International Journal of Public Sector Management*, vol. 17, no. 4, pp.286-301

Hackney, R., Jones, S., & Lösch, A. (2007). Towards an e-Government efficiency agenda: the impact of information and communication behaviour on e-Reverse auctions in public sector procurement. *European Journal of Information Systems*, vol. 16, no. 2, pp.178-191

Hall, B. H. (2005). Innovation and Diffusion. Inn Fagerberg, J., Mowery, D. C., & Nelson, R. R. (Eds.). (2005). *The Oxford handbook of innovation*. Oxford university press.

Hendrych, L. (2017). E-government v Česku? Neúsěchů je mnoho, o úspěších se nemluví. [E-government in Czech Republic? Lot of failures, not lot of success for a discussion.] *Euractiv.cz,* 25 May, Available Online: http://euractiv.cz/clanky/digitalni-agenda/egovernment-v-cesku-neuspechu-je-mnoho-o-uspesich-se-nemluvi/ [Accessed 1 April 2018]

Hort, J. (2016). Estonsko změnilo svou státní správu na online aplikaci. [Estonia managed to change its government into the online app.] *M-journal.cz*, 8 June, Available Online: http://www.m-journal.cz/cs/e-estonsko-zmenilo-svou-statni-spravu-na-online-aplikaci__s288x12052.html [Accessed 30 March 2018]

Huang, Z., & Bwoma, P. O. (2003). An overview of critical issues of e-government. *Issues of Information Systems*, vol.4, no. 1, pp.164-170

International Telecommunication Union (2017). Global Cybersecurity Index 2017. Available Online: https://www.itu.int/dms_pub/itu-d/opb/str/D-STR-GCI.01-2017-PDF-E.pdf [Accessed 30 April 2018]

Kalvet, T. (2012). Innovation: a factor explaining e-government success in Estonia. *Electronic Government, an International Journal*, vol.9, no.2, pp.142-157

Kitsing, M. (2011). Success Without Strategy: E-Government Development in Estonia. *Policy & Internet*, vol. 3, no. 1, pp.1-21

Kubátková, E. (2017). „Frontu na úřadu jsem nestál 10 let a průkaz mi stačí jeden" říka expert na e-Government. ["I did not quee at any governemt office since 10 years ago, and on card is enough" says the expert on e-government.] *Info.cz,* 3 September, Available Online: http://www.info.cz/svet/frontu-na-uradu-jsem-nestal-10-let-a-prukaz-mi-staci-jeden-rika-expert-na-e-government-13773.html [Accessed 1 April 2018]

Margetts, H., & Naumann, A. (2017). *Government as a platform: What can Estonia show the world*. Research Report. Available Online: https://www.politics.ox.ac.uk/materials/publications/16061/government-as-a-platform.pdf [Accessed 31 March 2018]

Martens, T. (2010). Electronic identity management in Estonia between market and state governance. *Identity in the Information Society*, vol. 3, no. 1, pp.213-233

Martin, B. R. (2013). Innovation Studies: an emerging agenda. In *Innovation Studies: Evolution and Future Challenges*, pp.168-186

Ministry of Economic Affairs and Communications of Estonia: Digital Agenda 2020 for Estonia. [pdf] Available Online: https://www.mkm.ee/sites/default/files/digital_agenda_2020_estonia_engf.pdf [Accessed 31 March 2018]

Ministry of Economic Affairs and Communications of Estonia. (2012). Framework for Self-service Environments. [pdf] Available Online: https://www.mkm.ee/sites/default/files/self-service_framework.pdf [Accessed 31 March 2018]

Ministry of Economic Affairs and Communications of Estonia. (n.d.) Usability Requirements for the Framework for Self-Service Environments. [pdf] Available Online: https://www.mkm.ee/sites/default/files/usability_requirements.pdf [Accessed 31 March 2018]

Mortensen, P. S., & Bloch, C. W. (2005). Oslo Manual-Guidelines for Collecting and Interpreting Innovation Data: Proposed Guidelines for Collecting and Interpreting Innovation Data. Organisation for Economic Cooperation and Development, OECD.

Nelson, R. R., Peterhansl, A., and Sampat, B. N. (2004). Why and How Innovations Get Adopted: A Tale of Four Models, *Industrial and Corporate Change*, vol. 13, no 5, pp.679–699

O'Brien, R., & Redman, N. (2004). E-government in Central Europe: Rethinking public administration. *Economist Intelligence Unit (EIU)*.

OECD. (n.d.). Background paper: Implementing e-government in OECD countries: experiences and challenges. Available Online: http://www.oecd.org/mena/governance/36853121.pdf [Accessed 31 March 2018]

Papadomichelaki, X., & Mentzas, G. (2009). A multiple-item scale for assessing e-government service quality. In *International Conference on Electronic Government*, Springer, Berlin, Heidelberg, pp.163-175

Petrov, O., Bunchuk, M., Stott, A. CH., Charles; Hohlov, Y. (2016). Digital government 2020: prospects for Russia (English). Washington, D.C.: World Bank Group.

Pollitt, C. (2011). Innovation in the public sector: an introductory overview. In *Innovation in the public sector*. Palgrave Macmillan, London, pp. 35-43

Raábová, M. (2015). Jedna karta na všetko. Ako funguje e-government v Estónsku. [One card for everything: How does the Estonian e-government work?] *Sme.sk*, 21 October, Available Online: https://ekonomika.sme.sk/c/8044625/jedna-karta-na-vsetko-ako-funguje-e-government-v-estonsku.html [Accessed 30 March 2018]

Raábová, M. (2018). Pellegrini informatizáciu ani za roky veľmi neposunul. [Many years have passed and Pellegriny did not manage to improve government digitalization significantly.] *Sme.sk*, 22 March, Available Online: https://ekonomika.sme.sk/c/20787272/pellegrini-informatizaciu-ani-za-roky-velmi-neposunul.html [Accessed 30 March 2018]

Republic of Estonia. (2018). Become an e-resident. Available Online: https://e-resident.gov.ee/become-an-e-resident/ [Accessed 23 April 2018]

Rogers, E. M. (2003). *Diffusion of innovations*. New York, Free Press.

Roth, D. (2004). Catch us if you can. *Fortune*, vol. *149*, no.3, pp.64-64

Sakowicz, M. (2003). How to evaluate e-government? Different methodologies and methods. *Eleventh NISPAcee Annual Conference*. pp.1-8

Saparniene, D. (2013). From e-government to e-governance: e-initiatives in europe. Siauliai University, Lithuania.

Smith, KH. (2005). Measuring innovation, chapter 6 in Jan Fagerberg and David C. Mowery and Richard R. Nelson (eds.), *The Oxford Handbook of Innovation* , Oxford University Press, New York, US, pp.148-177

Sheridan, W., & Riley, T. B. (2006). Comparing e-government vs. e-governance. *Commonwealth Center for e-Governance*, pp.1-5, Available Online: https://www.geospatialworld.net/article/comparing-e-government-vs-e-governance/ [Accessed 7 April 2018]

Tamkivi, S. (2014). Lessons from the World's Most Tech-Savvy Government: An Estonian shares his country's strategy for navigating the digital world. *The Atlantic*. Available Online: https://www.theatlantic.com/international/archive/2014/01/lessons-from-the-worlds-most-tech-savvy-government/283341/ [Accessed 31 March 2018].

The World Bank. (2018). GDP per capita (current US$). Available Online: https://data.worldbank.org/indicator/NY.GDP.PCAP.CD?locations=PL-CZ-FR-DE-SK [Accessed 30 April 2018]

Torres, L., Pina, V., & Acerete, B. (2005). E-government developments on delivering public services among EU cities. *Government Information Quarterly*, vol. 22, no. 2, pp.217-238

United Nations – Department of Economic and Social Affairs. (2016). E-government survey 2016. E-government in support of sustainable development. [pdf] Available Online: http://workspace.unpan.org/sites/Internet/Documents/UNPAN97453.pdf [Accessed 3 April 2018]

Vassil, K. (2016). Estonian e-Government Ecosystem: Foundation, Applications, Outcomes. *Background Paper for the World Development Report* [pdf] Available Online: http://pubdocs.worldbank.org/en/165711456838073531/WDR16-BP-Estonian-eGov-ecosystem-Vassil.pdf [Accessed 31 March 2018]

Appendix A

Thesis interview – instructions

The aim of the testing is to compare the user-experience with using two central national e-government portals – Estonian and Slovakian, for the information search.

Your task is to work with portals slovensko.sk and eesti.ee (in the second case in English). The following information are to be searched:

1. You have lost the national ID document; what steps should you take next?
2. You are planning to study at the university. What kind of financial aid does the government offer?
3. How does the government financially support parental leave?
4. What are citizen's rights if he/she purchased goods from internet website?
5. You are planning to change a permanent residence, what are you required to do?

In the case you are not able to find answer for a question after couple of minutes, please skip to next one. The blank paper is to be used for your notes. Interview will be conducted for each country separately and will be focused on the following aspects:

1. What browser did you use? Were all pages loading quickly and correctly?
2. Did you manage to find all searched information online?
3. Do you think the information was given in the right amount?
4. Did you consider provided information to be easy to understand?
5. Could you find looking information relatively quickly?
6. Were you often redirected to another portal?
7. Were navigation, menus, and buttons on the websites intuitive to use?
8. Was it easy to find contact or additional support?
9. Were you able to find "give a feedback" option?
10. How did you like the design of the websites?
11. What improvements would you recommend?
12. Would you like to add anything else? Which portal would you prefer as a citizen?

After done searching for information, please work 5 more minutes with both central websites to get them know more without specific instructions.

Thank you, for your time.

Daniel Kozák

Appendix B

Information about interviewees

Name	Age	Sex
Respondent 1	21	F
Respondent 2	55	F
Respondent 3	23	M
Respondent 4	23	M
Respondent 5	49	F
Respondent 6	23	M
Respondent 7	32	M
Respondent 8	42	M
Respondent 9	53	M
Respondent 10	21	F

All respondents voluntarily agreed to participate in the thesis research and approved the recording of the interviews on the mobile device. They did not specifically give consent to publish their names together with responses. Therefore, anonymous labels *Respondent 1* to *Respondent 10* are used in the thesis. The transcript of all interviews is available in the Slovak language upon request.