UNIVERSITÀ POLITECNICA DELLE MARCHE

FACOLTÀ DI ECONOMIA "GIORGIO FUÀ"

Master's Degree in International Economics and Commerce

E-Government for Businesses in Estonia: A European perspective

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Academic year 2020/2021

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Abstract

Negli ultimi due decenni, la rivoluzione di Internet e delle tecnologie dell'informazione e della comunicazione ha facilitato i metodi di interazione tra i cittadini e il settore pubblico, così come le imprese verso gli enti governativi. Il fenomeno di Internet ha aiutato i governi e le imprese a ridurre i costi e gli oneri amministrativi e a trasformare la società in una e-society; il governo elettronico/digitale sta cambiando completamente il tradizionale rapporto "non digitale" tra cittadini, imprese e governi. Tra questi, l'Estonia si sta distinguendo come un precursore nelle relazioni governo-impresa, e sta scalando posizioni nell'ambito dell'iniziativa del Mercato Unico Digitale dell'Unione Europea e sta implementando con successo questi servizi nel paese con la propria iniziativa localizzata di E-Residency, X- Road che la porterà a diventare il modello di riferimento per l'esportazione di questi servizi all'estero.

Inoltre, la tesi ci aiuterà a capire se il modello estone di E-Government sta aiutando le imprese e i governi a ridurre con successo i costi e gli oneri amministrativi e a verificare l'effettiva possibilità di attuazione dello stesso in altri paesi.

Introduction

With the influence of Information Communication Technology (henceforth: ICT) and its adoption in the governmental sector had a great impact on the various aspects of how citizens and businesses interact with different governmental services, resulting in new types of services being introduced, namely e-services and the development of electronic government (henceforth: E-Government) such developments are changing the way that Small Medium Enterprises (henceforth: SME), firms, in other words, businesses, and governments to interact differently and easily, at the same time this relationship raises an increased interest among countries in understanding how e-servicing could eventually decrease the administrative burden, and cost of service with the minimum budget possible, and how this knowledge leads to better frameworks for e-service provision, but also increase the exports and eventually increase the GDP of the country.

The Information era puts a major administrative burden on all businesses. Companies give over considerable resources to administration, regular tax declarations, managing the social security status of their employees, or applying for permits to carry out their businesses. These compliance costs hindering economic growth in general and burdens smaller companies, in particular (Nijsen, 2003 et al). The total administrative burden on businesses within the European Union has been estimated at approximately 600 billion euros per year, varying from 1.5% of GDP to 6.8% of GDP in EU states.

All around the world the reduction of the administrative burden on businesses has become an important policy theme. The main drivers behind ‘Better Regulation Programs’ are the

assumptions that a stronger focus on the reduction of the administrative burden on businesses will lead to better policies, better implementation, better compliance, and ultimately, better government. To reinforce this agenda by early 2007 the European Commission adopted the Action Programs for Reducing Administrative Burdens in the European Union by using E-Governments. The Action Plan was endorsed by the European Council which underlined the goal of setting a target to reduce administrative burdens stemming from EU law by 25% every 5 years. This reduction could lead to an increase of 1.4% of EU GDP (European Commission, 2007), and still, this initiative is stated in new action plans.

With this initiative, countries have been spending millions of Euros and have been implementing their initiatives, especially the ever-growing nature of technology and business, Government to Business (G2B) services putting into spotlight quite recently. Among them, one of the forerunners is undoubtedly Estonia, which uses G2B services most successfully and being the leader country (United Nations, 2012) and eventually exporting this as a digital product service to worldwide. The Estonian government has had a strong policy aspiration in this progress. Since 1990's the Estonian government stated that their ambition was to become an internationally leading information society accessible to all, 24 hours every day and aiming to improve efficiency and they have been leading in the Digital Public Services, which translates them being a leader in the Government to Businesses (G2B) services in the whole European Union.

In this thesis, we will focus our research on a European Union member state of Estonia, how they are successfully using E-Government in the Government to Business interaction services to reduce the administrative burdens and costs and conduct a deeper analysis of implemented

Government to Business (G2B) e-services and, further we will investigate what learnings and initiatives from Estonia that could be implemented in other countries.

Methodology

The methodology of this thesis consists of case study research, deep country analysis, Standard Cost Model (SCM), and panel data regression. The case study contains study research of two parts: extensive literature-based research, and in-depth analysis of Estonia. In panel data regression section, we tried to investigate E-Government usage for Government to Citizen (G2C) interactions in Estonia and the European Union 27 member states and what they can learn from Estonian experience. As one of the main ideas of this thesis is to look, whether the E-Government for Business in Estonia, has reduced administrative cost and burdens made easier for citizens and businesses, we have used a well-known framework for determining administrative burden and a methodology for quantifying the burden is the Standard Cost Model (SCM According to SCM, "administrative burdens are the costs imposed on business, when complying with information obligations stemming from government regulation". However, given its narrow focus, SCM "does not provide for the assessment of the impacts of information obligations within a cost-benefit framework". Over the years, the EU has identified policy measures to reduce administrative burdens. According to the pioneering approach adopted by the leading governments already considered E-Government as being fundamental to achieving the Administration burden reduction goal. ICT-based solutions allow for a reduction of time, paper handling, waiting times and search and coordination costs for citizens, businesses, and government. Through a quantitative method, we can examine the relationship between E-Government and citizen and businesses and, its influencing factors for successful implementation of e-government in Estonia, thus allowing us to explore, what kind of variables play important role for reducing the administrative burdens and making it easier for the businesses to government relationships when using E-government.

Chapter 1: A brief literature review

Background

Overall, most studies have identified several key benefits that the digitization of government services can bring to citizens. For example, the quality of public services improvement, operating costs reduction, time savings for citizens, and the general economic improvement (Corydon et al., 2016). Although scholars are primarily concerned with the impact of E-Government on the administrative environment, there seem to lack the professionalization of business experience in using e-government services online.

The use of traditional face-to-face communication with governmental agencies and services still remains a preferable option in many states such as Italy even though with the latest introductions of digital services across the regions. The number of e-government users in Southern Europe is much lower than the average of EU countries (European Commission - Digital Economy and Society Index, 2020) (henceforth: DESI). Especially, ease of doing business and business services ; registering a company, filing taxes, public procurement are still at a low level. Governments usually focus on online interaction with its citizens might predict many benefits for the economy, there has been much wider socio-economic benefits that have been neglected[1]in the European Union (henceforth: EU). Via smarter usage of E-Government in the Government to Business interactions could help businesses to operate in any member state at the same time reducing time and costs of those activities and eventually achieve Single Market initiative in all across the EU.

[1] Kozak, D., 2018. Innovation in national e-governments. Estonia as a role model in the citizen-centric approach?

The main aim of using E-Government in the Business interactions is to reduce as much as possible the additional administrative burden that EU citizens and businesses face when they expand their activities in the other Member States eventually to create a digital single market. Therefore, in this thesis, we will try to propose a forerunner, role model country of Estonia to copy and/or learn the experience of e-government policies and initiatives such as E-Residency, X-road[2], Pandemic Hackathon 2020.

The reason for choosing Estonia is, in the last years, Estonia is often presented in various national and international indexes and in media as an example country, which despite 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 (Kubátková, 2017 et.al). This brings us the question of Estonian experience of using E-Government with Businesses significantly better than other countries?
Is the Estonian Government to Business (henceforth: G2B) experience reduces the administrative cost and burdens? Shall governments learn and/or copy Estonian experience when implementing successful E-government in their states?

Estonia is, in fact, the leader in successfully using E-Government in the region as well as all across the European Union. In terms of the Digital Public services section, 5a/b (DESI) Estonia has been ranking 1st across European Union countries. In the Digital Economy and Society Index (European Commission – DESI by components, 2020), it ranked 7th in Europe[3], and constantly improving its position in the last 17 years (DESI INDEX 2003-2020). In the E-government

[2] X-Road is a "centrally managed distributed Data Exchange Layer between information systems".
[3] https://digital-strategy.ec.europa.eu/en/policies/desi

development index (henceforth: EGDI) 2020 it ranked 3rd in the world[4], also far best from the many countries in EU. However, mentioned rankings are not well suited to measure whether Business services (G2B) are superior when using E-government services in Estonia. The DESI ranking consists of other categories and subcategories that do not seem to be directly related to the Business experience. In the EGDI ranking (UN, 2020), 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 the E-Government website does include specific function or not and therefore its value is limited.

Therefore, in order to illustrate better we have worked on Estonian case study of E-Residency built under the European Union Action plans to reduce the administrative burden through "once only policy" and Standard cost model. The following sections will be analyzing more in depth of the policy and implementation along with the quantitative results.

[4] https://www.un.org/development/desa/publications/publication/2020-united-nations-e-government-survey

What is E-Government

To understand the concept of Government to Business (G2B), we shall look from the basic connotation of "What is E-government?" first. Since the E-Government nature is a relatively new concept, we have listed different ways to iterate the E-government.

E-government is a developing field of study. The concept of e-government may have slight differences in its definition, but basically, it means that the government is working through the digital world and the communication between government and citizens is conducted by the use of electronic means (Means & Schneider 2000). The concept of e-government is still partly vague because many researchers are using it in a various way, but the most common definition of it has been launched by OECD, which states:

"e-government is the use of information and communication technologies (ICT`s), and particularly the internet, as a tool to achieve better government" (OECD 2003).

Other definitions would include the United Nations one, which defines E-Government as government transformation of external and internal relationships with the help of information technology (United Nations 2008: 69). Usually, the concept is defined in different ways depending on the perspectives it represents, whereas the researchers mostly agree that it is the utilization of ICT`s with the aim to promote governance and make public services better (Abu-Shanab & Khasawneh 2014). Therefore, one of the best definitions of e-government is from

OECD and the United Nations, which are being used in this thesis for the meaning of electronic government. According to (Pina et al .2009), e-government may be divided into broad and narrow meanings, the narrow means that the private sector experiences have been adopted to the public sector, whereas in a broader sense, E-government can refer to the main idea of governance, where it should increase transparency and accountability of governments and decrease the administrative burdens and make it easier to do the business in any state. Thus, as business and government relationships are linked closely with the new concept of E-government services (G2B), the thesis will focus on the broader sense of e-government to business relationships.

Furthermore, e-government includes transactions from the government to citizens (G2C), government to businesses (G2B), government to government (G2G), and government to employees (G2E) (Giannakopoulos & Manolitzas 2009: 291) The main focus in this thesis will be from the government to business (G2B).

Types of E-Government applications

E-Government operates by the interactions between objects within it (Jeong, 2007). There are four major interactions (Figure.1.1), each of which has a different operating mechanism. In the following sections, we will focus on those different types of interactions.

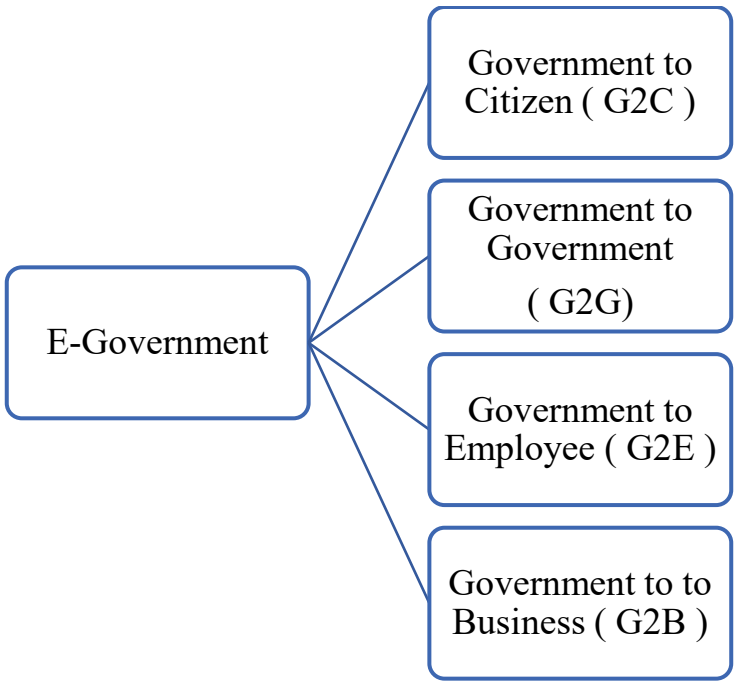


Figure 1.1 Types of E-Government Application

G2C "Government-to-Citizen": This is the crucial and initial relationship among E-Government interactions. Governments provide citizens with prompt, accurate, and convenient services, and citizens take an active part in providing feedback on services to the government and in giving opinions on policy decisions. The activities of these two parties are possible by the Internet and information and communication technologies (ICT).

G2G "Government-to-Government": In a narrow sense, this includes communication among ministries within the government or communication among federal and local governments. This includes communication among the government and government agencies or public organizations. The introduction of the Internet and information and communication technologies enables smooth communication and easy information sharing among the government and the government agencies or public organizations.

G2E "Government-to-Employee": This makes it possible for public servants, that is, government employees to be provided with online services such as checking and reviewing private information (annual leave, salary payment records). The exchange of opinions and information among public servants is much more convenient. In addition, the communication between the government and public servants becomes easier.

G2B "Government-to-Business": Interactions between the government and business, as implemented by E-Government, facilitates communication and understanding of government policies and regulations. This enhances the access to government for small and medium-sized enterprises (SMEs) as well as large enterprises who have bargaining power and information. This also creates new government-related ideas and businesses through the Internet and information and communication technologies.

Government to Business (G2B) interactions

To understand better the Government to Business (G2B) relationship and in line with our main topic of E-Government for Business, we decided to focus more on the G2B interactions in the following section.

As it was iterated by Jeong*, "G2B relationship is an interaction between governments and businesses implemented with the help of Electronic government, facilitates communication and understanding of a regulation and information online"*

Globally, Government to Business (G2B) Electronic Services (E-services) initiatives recently started receiving significant attention (Ntulo & Otike, 2013). The European Union policy prioritizes the development of G2B E-Services, developing more mature G2B E-Services than other categories. However, in research, Government to Business services receive far less attention than Government to Citizens (henceforth; G2C) (Ramos Junior & Galiotto, 2014).
A Government-to-Business relationship refers to professional affairs between regional, municipal, or federal governing bodies and businesses to satisfy the needs of businesses. Transparency, participation, and collaboration are three key factors in a G2B relationship (Wirtz & Birkmeyer, 2015). G2B processes often have multiple levels, involving multiple services and transactions, which are contingent upon one another.

According to the European commission yearly impact assessment, both businesses and citizens surveyed 10 of the most used services in accordance with E-services are the following:

Table: 1.1 10+10 most important procedures based on the outcome of the online public consultation

For businesses:	***For citizens***
Registration of business activity	Registering a change of address
VAT registration	Requesting or renewing ID card or passport
VAT return	Request a birth certificate
Corporate/business tax declaration	Request recognition of diploma from a foreign EU national
Recognition of professional qualification	Apply for a study grant
Registration for income tax	Enrol in university
Registration with national insurance scheme as employer	Declaring income taxes
Notification of cessation of activity subject to VAT	Register for social security benefits
Payment of social contributions for employees and payroll withholding tax	Register a car
Registration of employees with pension schemes	Register for a pension

Source: European Commission Impact assessment, 2017 Brussels

The European Action Plan monitors the progress of the abovementioned 20 distinct service categories, among them eight of which relate mostly to businesses (Janevski et al., 2015). These services categories are as follows:

1) Social contributions for employees

2) Corporate tax: declaration, notification

3) VAT: declaration, notification

4) Registration of a new company

5) Submission of data to statistical offices

6) Customs declaration

7) Environment-related permits (incl. reporting) and

8) Public procurement

European Union member states have been implementing G2B applications in their own nations in different levels, in order to create a more digitalized nation and eventually to create a digital single market in the union, at the same time supporting the SMEs to expand their businesses abroad and cut their cost and administrative burdens.

With the successful implementation of Government to Business relationship in a country would benefit in a various way of creating a business hub while attracting businesses from abroad with its easiness and efficiency and most importantly saves budget, in other words, reduces administrative cost and burdens. in the following section we will be analyzing more in-depth of potential benefits of G2B relationship.

Benefits of Government-to-Business application

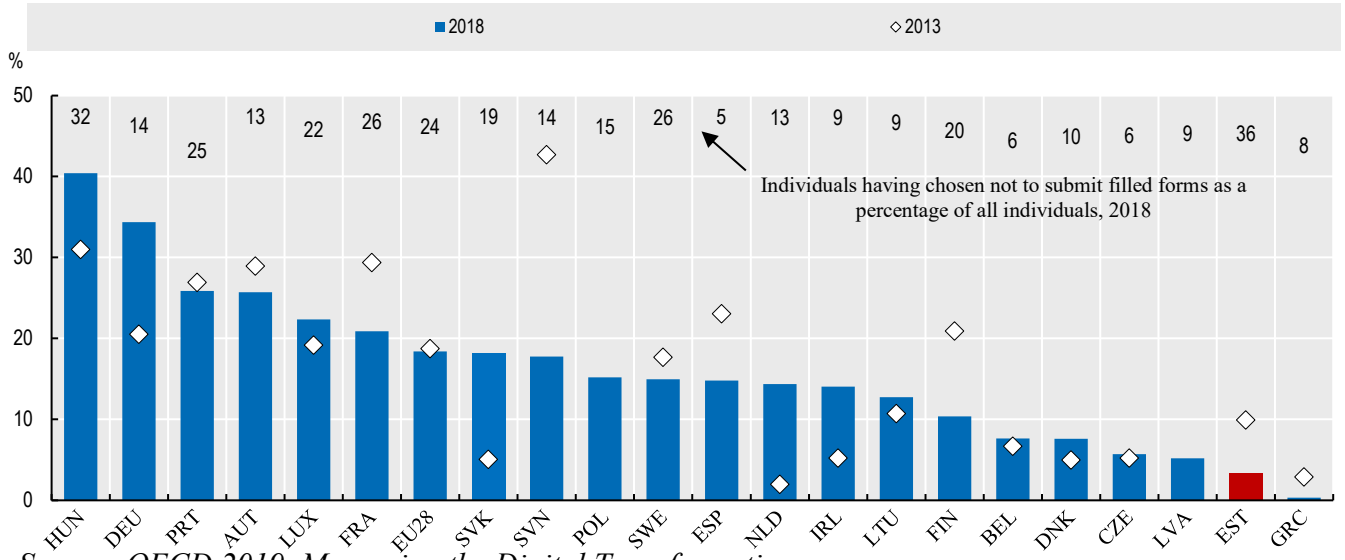
There are numerous benefits that G2B application brings to countries and businesses.
These include costs reduction, operational efficiency, improved decision making, better communication and coordination, improved transparency, increased relationship development, and reduction of administrative cost and burdens. In this study, we use the administrative burden reduction (henceforth: ABR) as the service performance measures of the G2B system use among governments since they are in line with the goals of many G2B system implementations. Furthermore, without the trust and knowledge of the services any country could achieve or reduce the administrative burden in this digital age, thus we will bring up information usability and reliability in the next section.

Information usability and reliability

Information usability and reliability are intrinsic parts of G2B application. The success of the G2B system is in its ability to interoperate the intended meaning from the perspective of the desired characteristics and the quality of the system such as accuracy, data format, meaningfulness, reliability/trust, and understanding to use it inside or even outside of the business countries. Similar to other information system applications, the G2B system keeps data in data warehouse and provides meaningful information within seconds. In addition, the information will be more organized, well-structured, and properly managed. This would later influence overall result of implementing E-government in the country by smoothing down the interaction between people and technology.

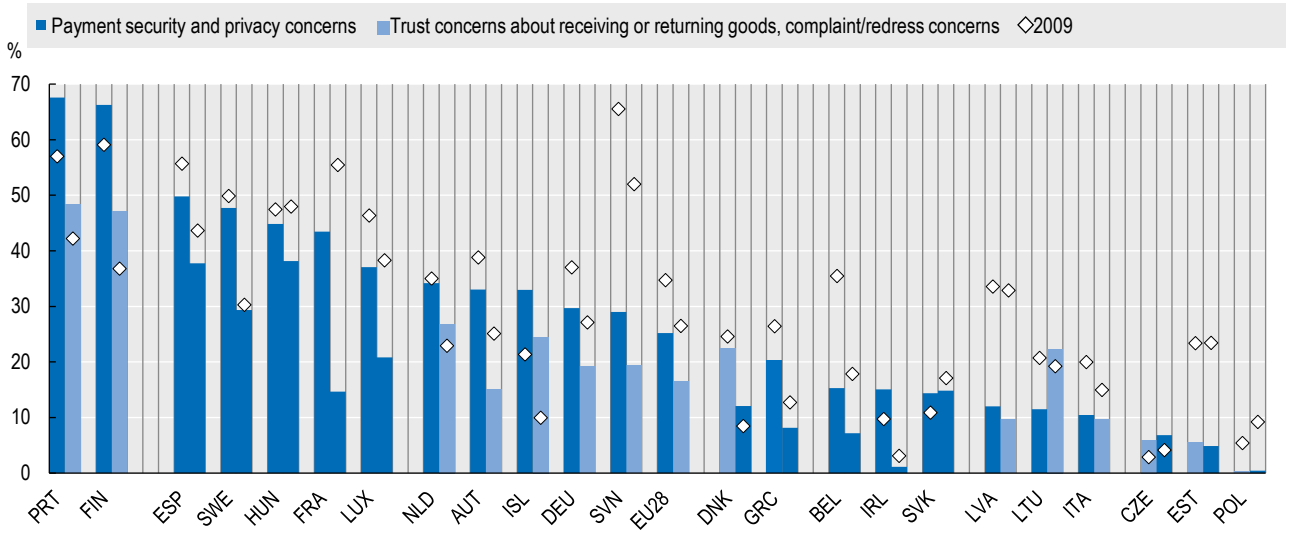
Figure 1.2 Trust of Key online services (Estonia focused) s

A. Individuals who did not submit official forms online due to privacy and security concerns, 2013- 2018



Source: OECD 2019, Measuring the Digital Transformation

B. Reluctance to buy online due to payment security, privacy and consumer redress concerns, 2017



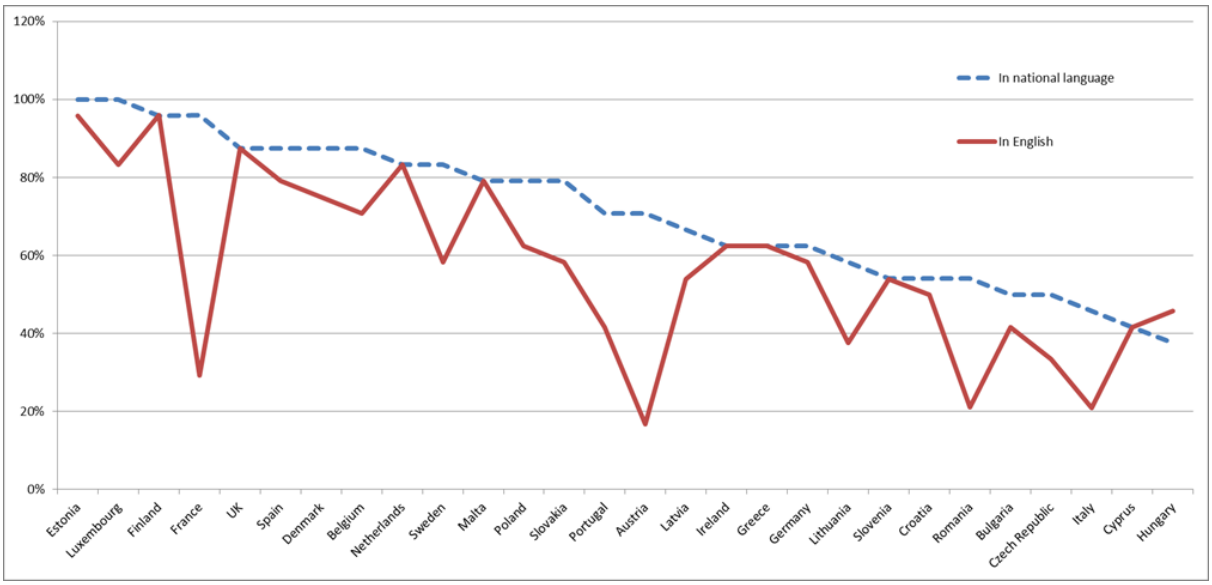
Source: OECD 2019, Measuring the Digital Transformation

The figure shows the trust of citizens and businesses in their digital privacy in OECD countries while filling digital forms, filing taxes, or making payment between the years of 2013-2018, as it's shown Estonia is a surprisingly "trusting state" in terms of their digital privacy and eagerness to use the digital services.

In order to businesses operate inside and outside to expand their business the regulation, ease of doing business, taxing, and more importantly, understanding this information is an essential part. According to the public consultation on the start-up and scale-up initiative, resources required to navigate the regulatory complexity is the third-biggest problem for SMEs.[5] More than half of SMEs say that national administrative procedures related to exporting to the other Member States are too difficult to comply with and therefore deter many firms from exporting.[6] The smaller the company, the less likely it is to sell abroad due to the lack of knowledge of the rules in the other Member States[7]. This leads to less choice and higher prices for consumers. In a Single Market of 27 Member States, the costs of gathering information rise rapidly, in particular through legal advice fees needed to find and understand the relevant requirements.

[5] Public consultation of the start-up and scale-up initiative.
[6] Flash Eurobarometer 421: Internationalization of Small and Medium-sized Enterprises https://data.europa.eu/euodp/en/data/dataset/S2090_421_ENG
[7] Flash Eurobarometer 413: Companies engaged in online activities. https://data.europa.eu/euodp/en/data/dataset/S2058_413_ENG

Figure 1.3: Information provided on current national websites (% of information to be required)



Source: European Union Impact Assessment Paper 2017, Brussels

Current coverage of information for businesses on national websites and portals within the eight areas set out in figure 1.3 is 71% on average, ranging from 38% up to 100% for the different Member States. These figures only concern the presence of the relevant information on any website, but do not address the findability, nor quality of the information. Moreover, the figures for accessibility of that same information for foreign users are much lower since only 57% of the information is available in a language other than the national languages of the country concerned. Accessibility of information for foreign users ranges from 17% for the lowest scoring countries to 96% for the best performer of Estonia. The information availability and trust might be related to reducing administrative burdens and we will analyze more in-depth by understanding the Administrative burden and costs and their relation to E-government in the next section(EU Impact Assessment Paper 2017 | Brussels)

What's an administrative burden?

The administrative burden can be defined as the recurring costs of administrative activities that businesses are required to conduct in order to comply with the information obligations that are imposed through central government regulation (OECD). Information obligations are a legal duty to retain or submit information on businesses' actions or production, either to public authorities or to private parties. Information is construed in a broad sense, for instance: including labeling, reporting, registration, monitoring, and assessment needed to provide the information.

Allers (1994) defines the administrative burden in terms of compliance costs: private sector costs of complying with regulations. Nijsen (2003) argues that discussions on the theme of administrative burdens have a strong political tint, focusing on the degree of governmental interference and the (according to the business representatives – inefficient) way this has been organized. Nijsen (2003) shows that entrepreneurs find it hard to define the extra costs of complying with information obligations. His definition, therefore, focuses on the question which information is needed by the government and what activities businesses have to perform to satisfy these needs.

"Transfer of information compliance costs are the integral costs of activities required to be performed by businesses to comply with specific obligations to transfer information to the government and which are over and above to the costs incurred for meeting the general book-keeping requirements"

The public administration perspective in this definition prevails over the business–economics approach. Nijsen's definition and perspective have become the foundation of the Standard Cost Model (SCM) measurement methodology Mistral (Nijsen & Vellinga, 2002), nowadays the common approach within the EU and the OECD (Wegrich, 2009). Nijsen's definition implies that governments are responsible for the level of information obligation costs, for example by specifying the volume, character, and frequency of the transfer of information obligations. Business-to-government information systems are part of this administrative infrastructure.

Administrative Burdens versus Administrative costs

Administrative burdens are the part of administrative costs that businesses sustain simply because it is a regulatory requirement. The administrative burdens are thus a subset of the administrative costs in that the administrative costs also encompass the administrative activities that the businesses will continue to conduct if the regulations were removed.

How can the E-government help to reduce the administrative burdens?

ICT-driven initiatives to reduce administrative burdens have been successfully implementing in OECD and EU countries in different forms, for example: centralized governmental portals and websites, forms online, online databases of laws and administrative regulations, electronic transfer of enterprise data to governmental authorities (henceforth: EDI), and e-procurement and digital single signature.

In practice, a small or medium-sized enterprise or business has to invest a considerable amount of time and resources in reporting to public authorities[8].

To reinforce the competitiveness, the business would like to establish an easy digital way to communicate the data to public authorities. Reporting to public authorities is a significant burden for businesses, especially for small or medium-sized enterprises, as it often requires providing the same data repeatedly to various levels of public administration. The way to improve the situation is through automatic business reporting. The elimination of paper handling costs and the reduction of wait and search times sum up to savings capacities per company and further to macro savings opportunities. This concept involves a central repository storing standardized data from individual companies. Public institutions would have access to the data and can reuse them instead of requiring information from businesses again. The approach can facilitate the way companies do accounting and will help to strengthen Europe's Digital Single Market and most importantly it states that Administrative Burden Reduction (ABR) can be achieved through the integration of E-Government tools (Action Plan 2011-2015); the smart use of the information that citizens and businesses have to provide to public authorities for the completion of administrative procedures in other words by G2B application; making electronic procedures the dominant channel for delivering E-Government services, and the principle of the “once only” registration of relevant data. This ensures that citizens and businesses supply certain standard information only once, because public administration offices take action to internally share this data, so that no additional burden falls on citizens and businesses.

[8] https://ec.europa.eu/isa2/actions/reducing-administrative-burden-businesses_en

The once-only principle

The once-only principle is European Union Action Plan initiative to reduce the administrative burden and costs, and moreover to create a digital single market through simple and easy digital signature or similar means[9]. Many countries have been implementing it in their own ways in accordance with this principle and one of the most successful and cost-efficient is Estonian version of E-Residency. In 2014, Ernest & Young's [10] how once only principle would benefit and impact research: On average around the world, starting a business takes 7 procedures, 25 days, and costs 32% of income per capita in fees and preparing, filing, and paying the firm's annual taxes could take up to 268 hours. On the other hand, in Estonia, this number is 1 day to start a business and 3 procedure – process, which in Estonian version is called E-residency and Digital Signature. The potential impact for the EU level by using the Digital Government and Once-Only principle in the EU is 5006.18 (Million Euros) and the Estonian impact would be 3.01 (Million Euros) and Italian impact would be 664.72 (Million Euros) respectively.
In the Chapter 2, we will focus on in-depth of E-Residency in Estonia and how it has been reducing the administrative cost and burdens.

[9] https://ec.europa.eu/cefdigital/wiki/display/CEFDIGITAL/Once+Only+Principle
[10] ECRF Conference, Rome, 4 June 2014 OUR DATA for economic development.

Chapter 2: Case study

Introduction

In this chapter, we will focus on a country analysis of Estonia, Institutional structure, a brief history of success in using E-government in Businesses and citizens, and a case study on Estonian initiative of E-residency and Digital signature, and the most recent digital innovation of Hackathon 2020 to fight against the global pandemic.

The Institutional structure of the Estonian Government

Estonia is a unitary and sovereign parliamentary democratic republic. The Estonian government upholds the principle of separation of powers (the executive, legislative, and judiciary branches). Estonian citizens elect 101-member single-chamber parliament every four years.

The Riigikogu, a unicameral legislative body, is the highest organ of state authority with legislative powers. The Estonian legal system belongs to the civil law tradition and has, since independence, been mostly influenced by the German legal system. Different areas of law have been influenced by experiences of the Scandinavian and other Western European legal systems. The Riigikogu also decides on the conduct of referenda, elects the Head of State (the President of the Republic), and authorizes the candidate for Prime Minister to form the Government of the Republic.

The Prime Minister has full responsibility and control over his/her cabinet. The President[11], who is elected by the Riigikogu, serves for a five-year period and can be re-elected for a second and last term. There are altogether seven constitutional institutions: Riigikogu, the President, the Government, the Bank of Estonia, the State Audit Office, the Chancellor of Justice, and the Supreme Court. There are principally two levels of government: the central government and local governments. The first level is the state or central government. The county government represents the state at the regional level without any legislative power. Administratively, Estonia is divided into 15 counties, most of which with a population of 40 000 – 50 000. Each county is run by a governor and the county government. Both the governor and the county government staff members are civil servants of the central administration. There is no elected regional government. The main responsibilities of the 15 county governors are to represent the interests of the state in the county and ensure the comprehensive and balanced development of the county, as well as to co-ordinate the co-operation of regional offices of ministries and other agencies of executive power and local governments in the county (Many state agencies and inspectorates, including those engaged in healthcare administration and funding, operate not on a county basis but through regional departments that cover two to four counties. A ministry (11 ministries altogether) is the superior body of executive agencies and inspectorates, and of other state agencies within its area of jurisdiction. Ministries are responsible for strategic planning. An executive agency is a government agency provided by law that operates within the area of government of a ministry, has a directing function, exercises state supervision, and applies enforcement powers of the state on the basis and to the extent prescribed by law. State inspectorates or agencies are government subsidiaries provided by law that operate within the

[11] Current president is Kersti Kaljulaid 2021 – The first female president in Estonia

area of government of a ministry, with the main function of exercising state supervision and enforcing powers of the state on the basis and to the extent prescribed by law.

Various levels of Government in Estonia Government of the Republic hold executive power and executes the domestic and foreign policies of the state, directs and coordinates the activities of government agencies, administers the implementation of laws.

County Governor and County Government: government agencies in the area of government of the Ministry of Internal Affairs. County governors represent the interests of the state in the county and care for the comprehensive and balanced development of the county. They monitor the activities of local governments. And with authorization from the Government, they also conclude administration contracts with local governments for the performance of the latter's state obligations.

Local Government: all local issues shall be resolved and managed by local governments, which in turn shall operate independently pursuant to law. Duties may be imposed on a local government only by law or by agreement with the local government. Expenditure related to duties of the state-imposed by law on a local government shall be funded from the state budget. Sources: The Constitution of the Republic of Estonia, Government of the Republic Act The second administrative layer in Estonia consists of single-level local governments with a total of 227 - that is, 194 rural municipalities and 33 cities, each of which has a population size from about 100 to 400,000 people.

The capital city of Tallinn is the largest local government with 400,000 inhabitants. All local issues are managed and resolved autonomously by local authorities. Cities and rural municipalities have budgetary autonomy and local taxing powers. The state may impose additional powers and responsibilities on cities and municipalities only in accordance with law and/or under a binding agreement between them. Such additional powers and responsibilities imposed on a local government must be funded from the state budget. There are large differences in per capita tax revenues among different cities and rural municipalities. Revenues in Northern Estonia are much higher compared to those in Southern Estonia.

Organizational structure for E-Government

Estonia is a rather decentralized country in terms of the organizational structure of ICT coordination. The direct development of information systems generally falls under the responsibility of IT managers in ministries, county governments, agencies and inspectorates, and local governments. Clear responsibility for dealing with information society and E-Governance issues on the Riigikogu level is missing. There is, however, the Constitutional Committee of the Riigikogu[12] that has been recently very active in eVoting debates. The Estonian information society policy is de facto developed by the representatives of the public, private, and the third sectors in a government committee, the Estonian Informatics Council [13], which advises the Government of the Republic. Since 2005 the Council has not actually held meetings. The central coordination unit of ICT management is the Department of State Information Systems at the

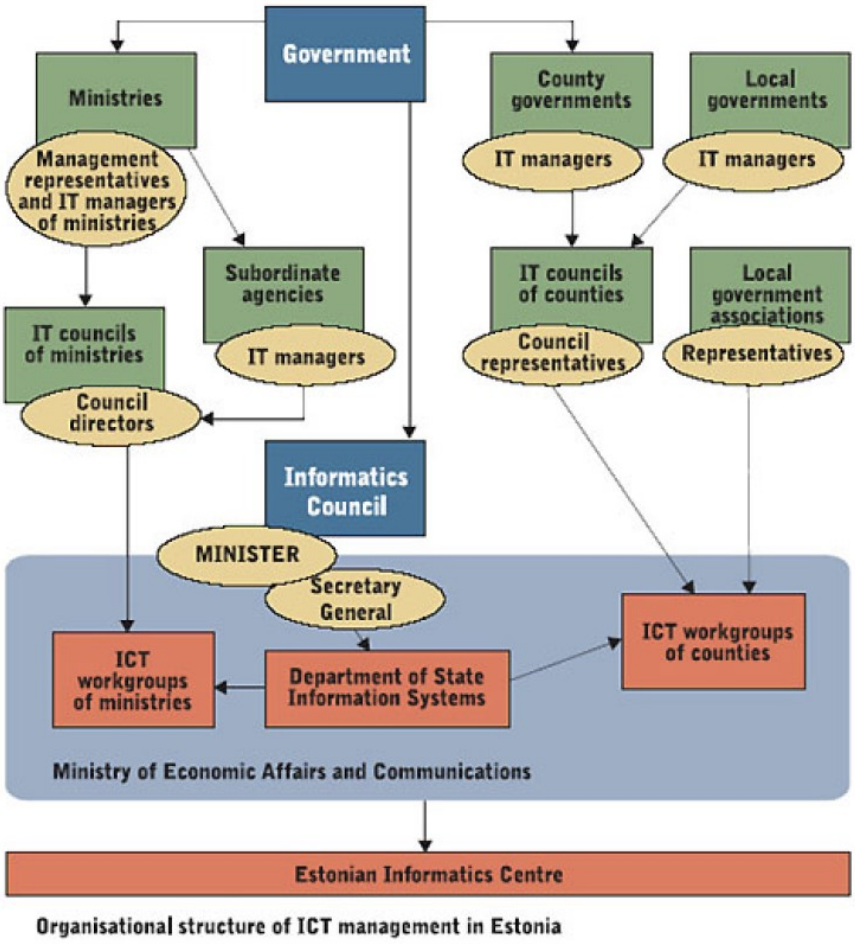
[12] Official Riigikogu website in Estonia - http://www.riigikogu.ee/?id=34658
[13] Estonian Information Council (Riso) official website- http://www.riso.ee/et/koordineerimine/IN

Ministry of Economic Affairs and Communications Responsibilities of the Ministry of Economic Affairs and Communications[14] include the development and implementation of the national policy and state plans with regard to informatics, telecommunications, and the co-ordination of the work of the state information systems.

The Ministry's Department of State Information Systems (RISO) is responsible for the coordination of state information systems as well as for the development and implementation of state IT strategies. Despite its small size (i.e., with only eight civil servants as of 2006) it has been a central and influential unit in the elaboration and implementation of these policies. RISO is working in close co-operation with different ICT working groups consisting of representatives of counties, ministries, and other public organizations.

[14]Ministry of Economic Affairs and Communications- http://www.mkm.ee

Figure 2.1. Organizational structure of ICT management in Estonia



Source: *Developments Related to the Organisational Management of ICT* 2004

Source: Developments Related to the Organizational Management of ICT 2004

The Estonian Informatics Centre [15] is an implementing body for government-wide information systems dealing with project management, including preparation of strategic IT projects for public institutions and organization of IT audits in national information systems.

Only a few local governments have ICT development units. Tallinn City [16] is the only one with an ICT Council that advises the City Government on ICT matters. In most local governments,

[15] The Estonian Informatics Centre - http://www.ria.ee
[16]Tallinn City official website http://www.tallinn.ee

ICT-related issues are addressed by the same specialists employed by the schools or by other public organizations. ICT development plans are generally missing in local governments: only 9% of local governments are reported to have one (Information Society in Estonian Local Governments, 2006).

E-Government development in Estonia

The following section discusses the historical background of Estonia from the perspectives of Estonian e-Government and ICT sector development and how Estonia is achieving a forerunner towards becoming the Digital State, example state among other countries.

Estonia, as a small nation of 1,3 million citizens, regained its independence from the Soviet Union in 1991. Being named as one of the most successful of Eastern European transition economies (Kalvet, 2012) Estonia had to face many challenges at the beginning of its pre-independence - like adopting new economic strategies, changing its political standpoints, and coping with the general consequences, including social and economic aspects, of the collapse of Soviet Union, just to name few.

Being nearly 50 years under the Soviet power, the country had to build up its economy and there was a visible need for many reforms. Estonia did not only need to reform its public agencies but there was a need to change the entire system of public administration (and all the reforms had to be made with little financial resources available (Petersoo, 2012). A favorable aspect for Estonia’s further development was the fact that from its mindset Estonia had always been closer

to Western countries (Liebert et al, 2013). This thought is supported by the fact that “in one of his 1992 speeches, president at the time, Lennart Meri called on his compatriots to become Europeans while preserving their Estonian roots and continued that we have always considered ourselves Europeans and Estonia as a state in Europe” (Berg et al, 2000, 619).
More than that, Estonia can be seen as one of the few ex-Soviet countries “that has been efficient in implementing generally accepted, democratic Western practices and has an outstanding reputation in information technologies”.

Within the last 20 years, Estonia has been moving towards a digital society and managed to achieve rapid growth in information society development (Kalvet, 2007) through building up its e-Government, internet banking, and other technical solutions which led the country to a high position in international indexes and gained global recognition (Nixon et al, 2007). As a result, Estonia has become one of the most digital and best-connected governments in the world with a variety of e-services available for the citizens as well as for businesses.

One of the reasons why Estonia has been so successful in its ICT sector development can be seen in forward-looking and innovative government who has been willing to invest and adopt new technologies, improvements made in the legal framework (Nixon et al, 2007), and peoples’ move towards a remote and easier business environment. Internet banking was becoming widely used because it made peoples’ lives easier – instead of going to the bank office to make your everyday transactions; it was possible to do everything from home. Estonia had a favorable environment for Internet banking because of the high user rate of the Internet in the society (Kalvet, 2007).

From the beginning of 1990s stable government funding was provided for the development of ICT sector which remained at around 1% of the total state budget. Since then the adoption of new technologies started to pave the way for Estonian. In 1994, the IT community in Estonia published the first ICT strategy paper where the main pillars of state information systems were brought out. It was called The Estonian Way to the Information Society (Kalvet, 2007). During the time when strategy paper was published there was still not many actions taken by government, which would have directly contributed to the development of the ICT sector in the country (Kitsing, 2011).

From the beginning of 2000s, ICT sector started to boom (Petersoo, 2012). Many new e-services and products were created, which had not been seen anywhere else before. This included services such as filing taxes, buying bus tickets, mobile parking, and many other everyday activities that have been carried out online since then (Kitsing, 2011). Citizens, as well as companies, adopted the internet relatively fast compared to many other European countries (Kerem, 2003) willingness to use IT in their everyday lives (Petersoo, 2012). Soviet Estonia started to invest to the IT sector in 1960s when the Institute of Cybernetics was opened as a part of the Academy of Sciences. Unlike other similar institutes in the area, the Institute of Cybernetics was focused on computer programming but also to other related fields such as mathematics and mechanics. During this time local IT community started to grow in Estonia and the period can be seen as start for Estonian e-Government development.

At the beginning of the 21st century, 43% of Estonians in age 15-74 were using the Internet (Luštšik, 2003). As the implementation of Internet banking was done in high-level, peoples' trust towards ICT started to rise. Currently, 99% of bank transactions are carried out online and only 1% is carried out in the physical bank offices (Financial Services, 2015). The high quality of the

online banking systems also convinced the public sector organizations “to use the identification verification system in Internet banking” (Sirendi, 2012, 9). Now, Internet bank is not used only for bank services like paying bills, viewing account balance, and using different loan calculators, but also as a point of access to many public e-services. Also, widespread of internet banking increased the trust of citizens to the institutions and made it easier to further connect and develop under one centralized system.

The most remarkable initiative by the government was the support to the Tiger Leap program in 1996, which aim was to support as many schools as possible in IT solutions (Kitsing, 2011). It was the first more vigorous attempt by the Estonian government to position itself as a “modern and competitive e-state” (Charles, 2009, 102). Before the Tiger Leap program was launched, Estonian private sector had already started to take more innovative steps by adopting new technologies. Hence, in 1996 the banking sector became an influential innovator in IT by introducing Internet banking (Kerem, 2003). After online banking service brought huge success in the country, from 2014 onwards, Estonia started country brand services of “E-residency and Digital Signature” which brings greater success to the country at the same time reducing administrative cost and burden and opens new doors for businesses to governments to step up in the next level.

Government to Business services relationships in Estonia

Similar to other countries using E-Government for Government to Business relationship, Estonia has started from the same starting point. However, with its quick and successful implementation, they are now leading and eventually being an example country exporting to other states.

One of the most successful and innovative initiatives Estonia has taken in accordance with EU Digital Single Market principle of "Once-Only principle" is the "E-Residency" .

What's an E-Residency?

Positive experience with the ID card among Estonians and its uniqueness in the world inspired the Estonian government to come out with the idea of E-residency in 2014. E-residency is a unique solution in the world and possibly a good example, which shows how e-Government services and Government to Business services solutions can help to attract business environment.

In other words, by giving an address or a family member's name to the census bureau, the health insurance provider or similar institutions would not be needed to ask it again. Similar for businesses as well, by registering once the further services such as filing tax, contribution, the declaration would use the previously registered information.

The E-Residency has been such a big success that, based on Estonia's common-sense innovation, the EU enacted a digital Once Only Principle and Initiative. It ensures that "citizens and

businesses supply certain standard information only once, because public administration offices take action to internally share this data so that no additional burden falls on citizens and businesses."

Asking for information only once is an efficient strategy to follow, and several countries have started to implement this principle including Italy (Carta d'identita[17])

E-Residency has shown unexpected success as soon as it launched in 2014, by reducing administrative burdens and costs in many departments between citizens, businesses, and governments. In 2014, The Estonian Tax and Customs Board is launched a new strategy [18] to address tax fraud, requiring every business transaction of over €1,000 to be declared monthly by the entities involved.

To minimize the administrative burden of this, the government introduced an application programming interface that allows information to be automatically exchanged between the company's accounting software and the state's tax system.

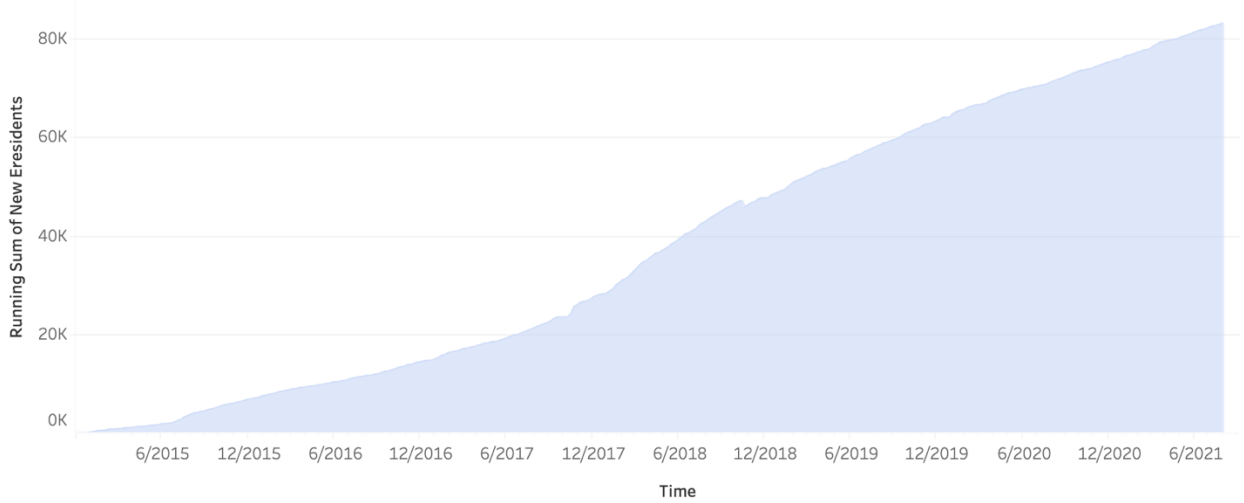
Though there was some negative push back in the media at the beginning by companies and former president Toomas Hendrik Ilves even vetoed the initial version of the act, the system was a spectacular success. Estonia surpassed its original estimate of €30 million in reduced tax fraud by more than twice and reduced the administrative burden of this service by 20%[19].

[17] https://www.esteri.it/mae/en/servizi/italiani-all-estero/documenti_di_viaggio/carta_identita.html
[18] http://fc15.ifca.ai/preproceedings/paper_47.pdf
[19] https://blog.politics.ox.ac.uk/welcome-e-estonia-tiny-nation-thats-leading-europe-digital-innovation/

Latvia, Spain, Belgium, Romania, Hungary, and several others have taken a similar path for controlling and detecting tax fraud. But analyzing this data beyond fraud is where the real potential is hidden.

After seeing big successes in several departments, E-Residency is seen as a big prospect for the Estonian economy by getting new investments and businesses to the country. It is seen to be especially useful for entrepreneurs and others who want to do business with Estonia, work, visit or study, without being a resident. One of the key goals of E-residency is to make Estonia the most attractive business environment in the world. E-residency will open Estonian e-services to foreign entrepreneurs and make it considerably easier for them to make business in Estonia. It is about increased business opportunities in services: establishing a company in Estonia and carrying out all related actions online; filing corporate documents, reports, and tax returns online, so it would be possible to own and manage a company online; online participation at shareholders' and board meetings; and signing of documents using a digital signature.
As the initiative is relatively new and goals are rather ambitious – 10 million e-residents by the year 2025 (Korjus, 2015a), is an ambitious goal to achieve, however, with the global pandemic and international physical movements are limited at this time, Estonia is using the E-Residency services to achieve the goal. Moreover, they are helping to fight against it with other countries by using this own initiative.

Figure 2.2 E-residents in numbers



Source: Statistics Estonia, Estonian Police and Border Guard Board, commercial register

According to statistics Estonia and E-Resident official website[20], since the introduction of E-Residency program, the number of E-Residents has been constantly increasing. In the last years, due to the global requirement of working from home and business travel restrictions have been playing positive roles the numbers to increase to 83.248 as of August 2021, while helping businesses and e-residents to benefit from this opportunity.

Besides the economical and user-friendliness, Estonian E-residency model attracts other countries by its authority and legal system. Unlike, Bitnation[21] Estonian model still controlled under governing bodies and the model is improving the system instead of completely changing or trying to build a non-physical controlled state.

[20] https://e-resident.gov.ee/dashboard/
[21] Bitnation, or crypto nation, is a "voluntary nation" that records vital records, identity and other legal events using blockchain technology.

E-Government in the time of COVID- 19 pandemic in Estonia

With the quick spread of the Coronavirus-19 global pandemic, the world has changed into working in "new normalization". Due to lockdowns and border closures around the world, Covid-19 has necessitated a shift online for individuals and businesses operating in the public and private spheres. Many countries were taken by surprise by the sudden need to do so, especially numerous businesses, however, in Estonia the digital development and E-government usage were widely accepted and have been helping to overcome possible backlashes.

Like other countries, Estonia has also been contracted to the pandemic's economic effects, with economists forecasting a contraction of its GDP[22] and an increase in the unemployment rate[23] in the second half of 2021. The effects have massively affected the international, tourism, hospitality, trade, manufacturing, and transport sectors. However, the country's strength in digital government and literacy to E-government has allowed it to escalate the situation quickly and took advantage of their already built systems of X-Road, E-Residency and recently creating Hack the Crisis -2020 network all around the world.

According to the official electronic ministry website, 99% of Estonia's government services[24] are available online. In February 2020, Estonia declared that the e-governance and other online services were unaffected by lockdowns and travel restrictions. The lack of disruption extended

[22] https://www.eestipank.ee/en/press/economy-likely-shrink-more-6-25032020
[23] https://news.err.ee/1090433/swedbank-unemployment-could-reach-15-percent-by-autumn
[24] https://e-estonia.com/

public trust to the crisis response. The procedures for workers and businesses to apply for unemployment benefits, relief loans and grants, or tax relief, were seamlessly integrated into the existing e-governance platform (E-Residency/ X-Road)

With the smooth interoperation of the public health system and Governments, Businesses were helping to address the expected economic downturn, both immediately and in the long term.

In terms of the other digital services provided by the Government, Estonian schools already used e-learning methods for several years prior to the pandemic. Digital health records and e-prescriptions eased Covid-19's added burden on the healthcare system and also limited unnecessary contact between frontline workers and citizens.

As an extension of its own digital capabilities, Estonia has contributed to the growth of and ability to remote work for years. Companies like Skype and TransferWise trace their origins to Estonia. This cosmopolitan mindset is also seen in the public sector. Through e-Residency, Estonia opened up access to its digital services to the world, enabling digital nomads and location-independent entrepreneurs to run their businesses online from anywhere.

According to the Estonian E-residency statistics[25], the number of e-residents joining the program has been growing steadily, especially new enterprises and business are growing faster compared to previous years, thus the pandemic negatively affects the E-Residency.

The widespread use of digital signatures helped for a workforce to work online as a result of Covid-19, which did not cause issues for decision-making, bandwidth, or overload the country's digital services. Civil servants easily transitioned to full-time home office conditions after one

[25] https://www.stat.ee/en/uudised/iga-viies-e-resident-registreerib-eestis-ettevotte

day of testing. The main telecommunications providers allowed residents and citizens with unlimited data usage during the crisis, which even increased the usage of E-Government services since[26].

Hacking the crisis

In 2019, when the coronavirus – 19 declared as a global pandemic – Estonia was with its strong digital foundations has developed a flourishing plan to fight against and teach their experience to other countries and businesses. Estonia's digital ecosystem is not purely made up of government actors; in fact, the government actively encourages and incentivizes the private sector to move into or create markets for products and services it cannot or is unable to offer. Throughout the crisis, these private sectors have worked with the government to solve challenges and create solutions, ensuring a multistakeholder response.

The collaboration of the Government and private sectors was the national hackathon- Hack the Crisis[27], which was organized in less than a day by Estonian company Garage48 and government innovation lab Accelerate Estonia. It brought together over 1000 people from diverse professions hacking tech-based solutions over 48 hours. As a result, Suve[28]- the Covid-19 answer bot, is already in use on Estonian Government websites and koroonakart[29] remains the country's official Covid-19 data repository. Ultimately, the national hackathon developed into an international

[26] https://e-estonia.com/
[27] https://garage48.org/blog/fighting-the-covid-19-pandemic-with-the-power-of-community
[28] https://eebot.ee/
[29] https://koroonakaart.ee/en

Hack the Crisis community and sparked over 50 others around the world, as well as the Global Hack.

Being an advanced digital nation may not have prevented Covid-19 from affecting Estonia, but it did help in its response.

Public services continued online even increased their use by 99% compared to the previous year despite lockdowns and freed up time for the government to adapt and test solutions in response to the social, political, and economic consequences of the crisis.

Digital Health [30]and e-prescription services improved its efficiency and widened its services by using a digital signature, it helped a lot of health workers, this allowed doctors to prescribe medications in 15 seconds, thus front-line workers could spare the time into much needed patients and much prior tasks.

Online education was another huge success, thanks to the country's previous infrastructure. Even before the pandemic started, 87% of Estonian education institutions[31] were using online and digital education method and again broadband connection is nearly fully penetrated and free, the country transitioned easily and helped other states with its online educational services.

The case of Estonia provides a useful framework for policymakers around the world as it demonstrates a real-life example of the value of digitally transforming governance structures and services, even during a pandemic and the initiative of E-Residency has been attracting even more E-Residents (Businesses) around the world with the physical limitation of international movements.

[30] https://e-estonia.com/enter-e-estonia-digital-health/
[31] https://e-estonia.com/education-nation/

Chapter 3: Econometric analysis and Standard Cost Model

Introduction

In this chapter, we will be analyzing in-depth our previous hypotheses using quantitative and qualitative research methods. First, we will be introducing DESI (2020) and EGDI indexes to show the current state of development of digital development in Estonia compared with other member states of the EU and followed by regression by using panel data regression to see if the Estonian model of E-government is applicable to other countries and what variables are making Estonian E-government model successful. Then, we will introduce the Standard Cost model for Administrative Burden Reduction on starting a new business in Estonia.

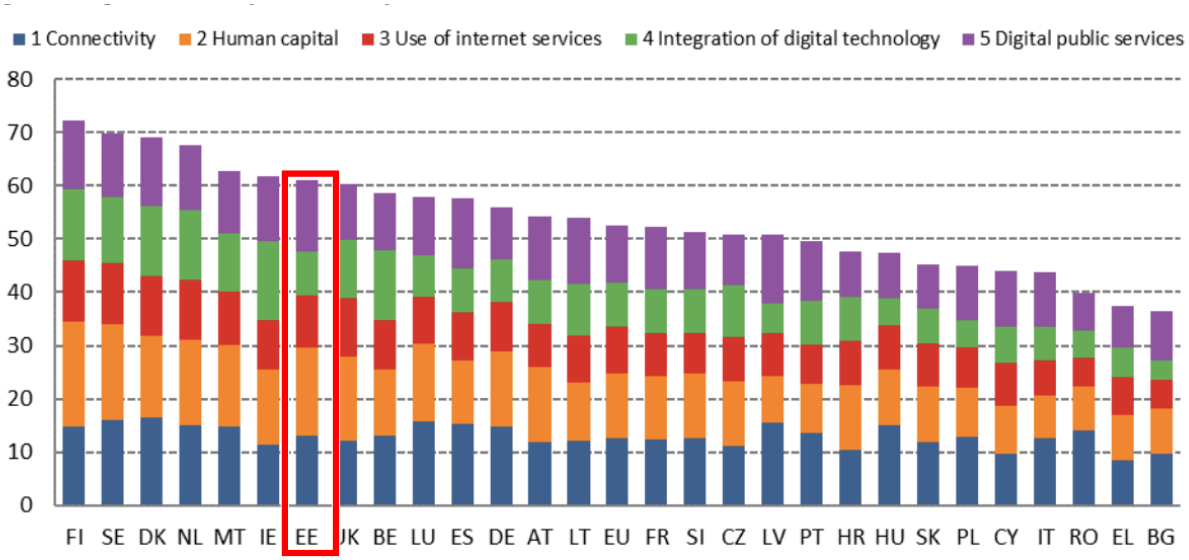
Digital Economy and Society Index

The Digital Economy and Society Index summarizes relevant indicators on Europe's digital performance and tracks the evolution of the Digital Single Market in the EU Member States. It includes five principal dimensions that are connectivity, human capital, use of internet, integration of digital technology and digital public services.

This index shows which are the more advanced countries in the development of digital economy. Not surprisingly, the countries that rank at the top are the Nordic ones, Denmark, Norway, Netherlands, Sweden, Finland, and Estonia ranks 7th in 2020 DESI index. On the other hand, Italy

is at the bottom of the chart and scores better only than Greece, Bulgaria, Romania, and ranks 4th from the bottom on the 2020 index.

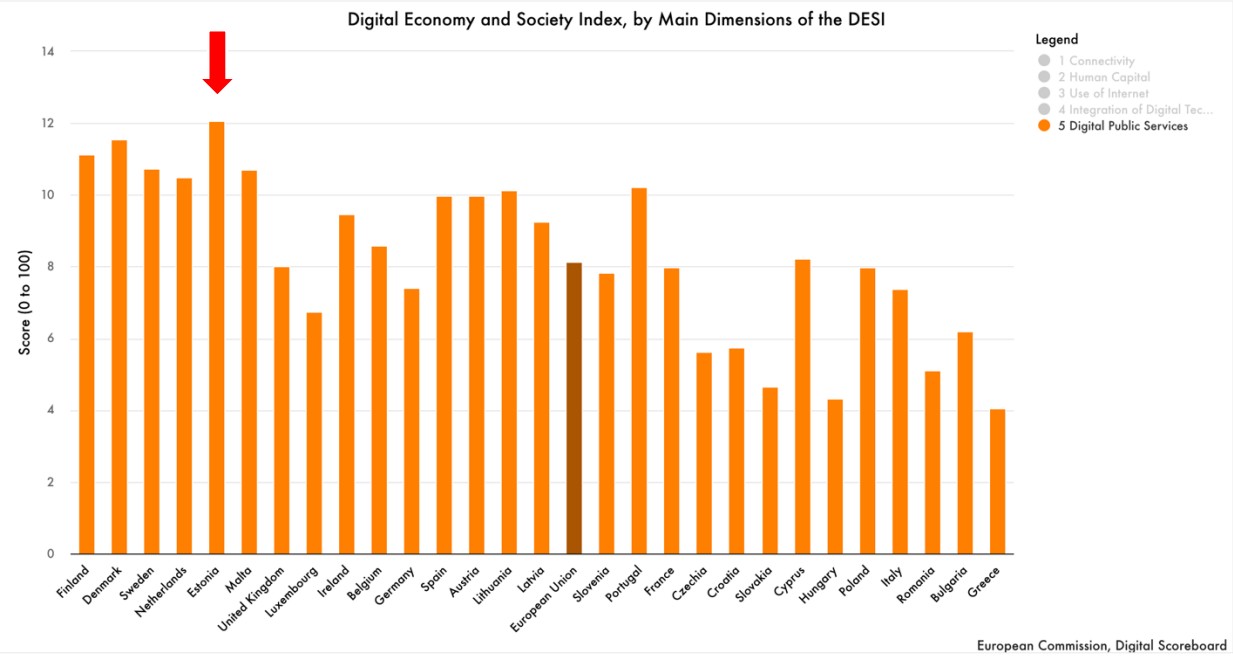
Figure 3.1 Digital Economy and Society Index



Source: European Commission 2020

In accordance with our thesis, the Government to Business relationship application falls under the Digital public service dimension. As we can see from the visualized graph, Estonia is beyond over 12 points and being the leading country, hence, EU average is 8 points. This is related to the aforementioned successful initiatives of E-residency and X-Road systems and its user-friendliness and ease of usages.

Figure 3.2: Digital Public services dimension - DESI Index /5a, 5b/



Source: European Commission 2020

E-Government Development Index

The EGDI is a composite indicator that consists of three indexes (Online Service Index, Telecommunication Index, and Human Capital Index) that are equally weighted and cover a broad range of topics that are relevant for e-government, which assesses national websites and how e-government policies, and strategies are applied in general and in specific sectors for delivery of essential services.

Combined EGDI shows that in the last ten surveys Estonia has been raising their ranking and in the latest survey of 2020, they have ranked 3^{rd} in the world.

Table 3.1 E-Government development index survey ranking

E-Government Development Index	2020	2018	2016	2014	2012	2010	2008	2005	2004	2003
Estonia (Rank)	3	16	13	15	20	20	13	19	20	16
Estonia (Value)	0.94730	0.84860	0.83344	0.81796	0.79873	0.69653	0.76000	0.73473	0.70289	0.69680

Source: EGDI Survey, UN database 2020

In terms of the E-Participation[32] index, Estonia has been showing a surprising jump in only 2 years, that they have taken the lead 1st. position from 27th, even bypassing Nordic, technologically advanced countries in 2020.

Table 3.2 E-Participation index ranking

E-Participation Index	2020	2018	2016	2014	2012	2010	2008	2005	2004	2003
Estonia (Rank)	1	27	22	22	8	9	8	11	11	5
Estonia (Value)	1.00000	0.91010	0.81356	0.76470	0.76320	0.68571	0.72727	0.61904	0.63934	0.75860

Source: EGDI Survey, UN database 2020

Panel data regression

Based on the previous sections, it's evident that the Estonian model works well, and in this section, we will be investigating the quantitative analysis of our previous hypotheses; The country's success in E-government and digital governance in small country with, favorable business condition, and high trust in institutions, and governments and almost fully penetrated broadband network, whether their model is possible to be replicated to other states.

The investigation of analysis uses two different data sources: First, individuals using E-Government services for public authorities (egov), followed by population size (pop), individuals

[32] Electronic participation (e-participation) is the term referring to ICT-supported participation in processes involving government and citizens. Processes may concern administration, service delivery, decision making and policy making

not submitting online forms to the public authorities due to privacy concerns (dgtltrst), broadband penetration (brdbnd) GDP per capita (gdp), number of immigrants (immg), and educational attainment level (educ) are extracted from the Eurostat database between 2011 and 2020. Finally, the same time period of data of Ease of doing business score (ezbiz) is extracted from the World Bank, doing business database. In the regression we have chosen Government to Citizen variables, since it's the intrinsic to G2B interactions and more open/wide available data, and in the second analysis of SCM model we have introduced the Government to Business interaction and how Estonian model reduces the administrative burden and costs followed by quantitative method.

Data variables

Constructs	Variable	Description	Source
egov	E-Government	Individuals using digital public services	Eurostat
pop	Population	Population size in log	Eurostat
dgtltrst	Trust	Individuals not submitting online forms to the public authorities due to privacy concerns	Eurostat
brdbnd	Broadband	Broadband penetration of households	Eurostat
immg	Immigration	Number of immigrants in log	Eurostat
ezbiz	Ease of doing business	Ease of doing business score in EU 27	World bank
gdp	GDP pc	GDP per capita in thousand euros	Eurostat
educ	Education	Educational attainment tertiary level, people having a at least tertiary education	Eurostat

Regression

Model 1: Random-effects (GLS), using 230 observations
Included 27 cross-sectional units
Time-series length: minimum 1, maximum 9
Dependent variable: egov

	Coefficient	*Std. Error*	*z*	*p-value*	
const	0.493559	1.22784	0.4020	0.6877	
pop	−0.139742	0.210845	−0.6628	0.5075	
dgtltrst	−0.0104771	0.00235906	−4.441	<0.0001	***
brdbnd	0.0192146	0.00541245	3.550	0.0004	***
immg	−0.00261511	0.170332	−0.01535	0.9878	
ezbiz	0.0181853	0.0121531	1.496	0.1346	
gdp	0.00282387	0.00191802	1.472	0.1409	
educ	0.0254450	0.00993728	2.561	0.0105	**

Mean dependent var	3.082829	S.D. dependent var	0.949207
Sum squared resid	81.90967	S.E. of regression	0.606059
Log-likelihood	−207.6227	Akaike criterion	431.2454
Schwarz criterion	458.7500	Hannan-Quinn	442.3402
rho	−0.193526	Durbin-Watson	2.180440

'Between' variance = 0.162727
'Within' variance = 0.0769397
mean theta = 0.761505

Joint test on named regressors -
Asymptotic test statistic: Chi-square(7) = 179.472
with p-value = 2.51827e-35

Breusch-Pagan test -
Null hypothesis: Variance of the unit-specific error = 0
Asymptotic test statistic: Chi-square(1) = 232.216
with p-value = 1.95883e-52

Hausman test -
Null hypothesis: GLS estimates are consistent
Asymptotic test statistic: Chi-square(7) = 34.7569
with p-value = 1.24247e-05

Result

The empirical analysis is completed by a panel data regression above. The dependent variable is (E-Government), we used *logit odds ratio,* in order to have a normal distribution for the plot, while (Population), (Trust), (Broadband), (Immigration), (Ease of doing business), (GDP per capita) (Education) are selected as independent variables. The choice between random and fixed effects models was made based on the results of performed *Hausman test* investigating whether the model residuals are correlated with the regressors or not, the *p-value* of the *Hausman test* was *1.24247e-05* so we rejected the null hypothesis (Chmelarova, 2007) and therefore in our analysis, we have chosen random effect model.

The results of the random effect model confirm most of the observations made after the top-bottom comparison of the Government to Citizens interactions of the chosen countries.
Population size, this first variable contradicts with our main hypothesis that the Estonian model could be implemented in other states regardless of the size of the country since the variable is negatively correlated to our dependent variable of E-Government.
Digital Trust is as expected negatively associated with E-Government, since we have chosen data of Individuals not submitting online forms to the public authorities due to privacy concerns, thus it's interpreted the more the people have trusted their government, public services and digital privacy by submitting forms online the more likely they use E-government services.
Another significant variable is broadband penetration, which represents the percentage of households with at least a first-generation broadband subscription: as we expected, it has a positive influence on our dependent variable, as it shows a marginal effect of *0.019* without an

internet connection the electronic services' potential could not be effectively exploited and this in certain sense broadband is the enabler of E-government services.

Immigration, however, is negatively correlated with our dependent variable of E-Government. This could be interpreted by our previous example, the Estonian case of E-residency, in which digitally advanced states are more likely to get electronic residents rather than physical ones.

Ease of doing business and GDP per capita thousand euros, both positively related to our dependent variable, evidently, countries with a favorable condition of businesses could be one of the reasons having higher usage of E-Government services.

Finally, the education variable correlates positively with our dependent variable - high level of education, tertiary or upper, results in an increase of the percentage of individuals uses digital services. This can be explained by the fact that, probably a person with a university degree is more likely to have the digital skills necessary to use this service. Thus, the higher the percentage of people with tertiary level education in country the more will increase the usage of E-Government online services.

Administrative Burden Reduction and SCM

The Standard Cost Model (SCM) is a method for determining the administrative burdens for businesses imposed by regulation. It is a quantitative methodology that can be applied in all countries and at different levels[33]. Before the SCM we will try to analyze the chosen years of data of starting/establishing a business or a company in European member states in accordance with our thesis since this is the part of eight main G2B interactions, we then introduce percentage of administrative burden reduction Estonia.

Administrative burdens facing a start-up can be measured by the number of procedures, time, costs, and minimum capital required. For the purposes of the empirical part, we used the Doing Business database (Doing Business Data, 2004-2020) to analyze public administration burdens applied to companies during the first stages of their lifecycles in EU27 countries. We focused on the first lifecycle stage – namely, starting a business. The sample consists of all EU countries for which the data on administrative burdens for starting a company were available (data were used for 27 EU countries). To observe the dynamic view of the changes in administrative burdens for starting a company, data from years 2004, 2007, 2016 and 2020 were used. Table 3.3 presents the initial data about administrative burdens on starting a business used in the analysis. The following indicators for measuring administrative burdens in starting a business were used (Doing Business, 2020)

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Table 3.3 Initial Data on Administrative Burdens Indicators when Starting a Business

Economy	Procedures [1] 2004	Time [2] 2004	Cost [3] 2004	Paid in minimal Capital [4] 2004	Procedures 2007	Time 2007	Cost 2007	Paid in minimal Capital 2007	Procedures 2016	Time 2016	Cost 2016	Paid in minimal Capital 2016	Procedures 2020	Time 2020	Cost 2020	Paid in minimal Capital 2020
Austria	8	25	6.1	65.6	8	25	5.6	60	8	22	0.3	13	8	21	4.7	11.15
Belgium	7	56	11.1	24.1	4	27	5.8	22	3	4	4.8	17	5	5	5.3	0.0
Bulgaria	11	32	10.4	86.7	9	32	7.9	64	4	18	0.7	0	7	23	1.0	0.0
Croatia	11	29	16.3	25.5	9	25	12	21	7	12	3.3	27	7	19.5	6.2	5.5
Cyprus	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	6	8	12	0	5	6	5.6	0.0
Czech Republic	10	40	10	47.4	10	24	8.9	37	8	15	6.7	0	9	24.5	1.1	0.0
Denmark	5	7	0	49.8	4	6	0	45	4	3	0.2	14	5	3.5	0.2	10.2
Estonia	**6**	**72**	**8**	**53**	**6**	**35**	**5.1**	**34**	**3**	**3.5**	**1.3**	**17**	**3**	**3.5**	**1.0**	**13.1**
Finland	3	31	1.1	29.8	3	14	1.1	27	3	14	1	6.8	3	13	0.7	5.9
France	8	41	1.3	29.2	5	7	1.1	0	5	4	0.8	0	5	4	0.7	0.0
Germany	9	45	5.9	49.1	9	22	5.1	46	9	11	1.8	34	9	8	6.5	29.8
Greece	15	38	32.7	135.2	15	38	22	116	5	13	2.2	0	3	4	1.5	0.0
Hungary	6	52	40.4	96.4	6	38	21	74	4	5	7.3	48	6	7	4.5	36.2
Ireland	4	18	10.4	0	4	13	0.3	0	4	6	0.2	0	3	11	0.1	0.0
Italy	9	23	22.1	11.6	9	13	20	10	5	5.5	14	0	7	11	13.8	0.0
Latvia	5	16	10.1	45	5	16	3.5	26	4	5.5	1.5	0	4	5.5	1.5	0.0
Lithuania	8	26	4	68	7	26	2.8	49	2	3.5	0.6	0	4	5.5	0.5	16.0
Luxembourg	n.a.	n.a.	n.a.	n.a.	6	29	12	23	6	19	2	23	5	16.5	1.6	17.2
Malta	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	10	28	11	1.4	5	20.5	6.7	1.0
Netherlands	7	9	13.3	67.2	6	8	7.2	62	4	4	4.6	0	4	3.5	4.0	0.0
Poland	10	56	21.3	247.4	10	31	19	204	4	30	12	11	5	37	11.6	9.3
Portugal	11	78	12	40.4	7	6.5	7.9	39	3	2.5	2.2	0	6	6.5	1.9	0.0
Romania	6	29	10.9	2.9	5	11	4.4	1.6	5	8	2	0.6	6	20	0.3	0.4
Slovak Republic	10	103	9.4	50.3	9	27	4.8	39	6	12	1.5	19	7	21.5	1.0	15.4
Slovenia	9	60	14.8	19.9	9	60	9.4	54	2	6	0	42	3	8	0.0	34.3
Spain	10	138	16.8	17.9	10	60	16	15	7	14	5.2	13	7	12.5	3.9	11.6
Sweden	3	16	0.7	38.5	3	16	0.7	34	3	7	0.5	12	4	7.5	0.5	10.5

Source: Doing Business Data (2004-2020).

Notes: [1] Number of procedures. [2] In days. [3] As % of the economy's income per capita. [4] As % of the economy's income per capita

Result and SCM

Based on the Doing Business data from World Bank, between 2004 and 2020, it's evident that most of the EU 27 countries have decreased the cost, procedure, time and paid minimum capital in the chosen years. Among them, Estonia, has shown overall great results in terms of procedure and time, especially after 2016 and this could be due to their ABR initiative of E-residency. In order to see whether Estonia has decreased the ABR, we have used SCM in the following section on starting/registering new businesses, since this action is one of the main relationships of G2B and in accordance with our thesis we wanted to check if the E-Residency has been successfully reducing the ABR after its introduction.

The basic formula used by the SCM is administrative burdens[34]:

T x Q (in hours) + C x Q (in €)

Where:

T and C stand for Time and Costs.

Variable Q | Q is calculated on the basis of two variables:

• Number of Businesses

• Frequency

The following is the SCM in Estonian Administrative burden reduction one Starting/registering new businesses.

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Table 3.4 Standard Cost Model for Administrative Burden Reduction in Estonia, (Starting a new business)

Variables/year	T	Q	C	Q	Total (TxQ)	Total (CxQ)	Total ∑PQ	ABR in %
2007	35	11,599	5.1	11,599	405965	59154.9	465119.9	
2016	3.5	16,572	1.3	16,572	58002	21543.6	79545.6	-83%
2020	3.5	14,200	1	14200	49700	14200	63900	-20%

Source: our interpretation of World bank, OECD, and Eurostat data

As we can see from the table 3.4, After the introduction of E-residency (2014), has been successfully reduced the business registration burdens by 83%, which is due to ten times reduction of time and costs of registering a new business, and the latest data shows that even though the new businesses registration fall in numbers the ABR still in effect and they have successfully reduced it by 20% in the last four years.

Chapter 4: Conclusions

The main objective of this thesis is to analyze the usage of E-Government to the Government to Business interactions in Estonia and their successful usage to reduce the administrative burden and to investigate whether their model is applicable to other countries. As the nature of E-Government is relatively new and many countries are still in the process of learning, we analyzed on the case study whether the Estonian model is replicated, and what factors are making them stronger, a forerunner, leading country in the field and helps them to successfully reduce the administrative burden, cost and attracting businesses around the world with their very own initiative of E-Residency.

Firstly, we introduced a brief literature review of E-Government, administrative burdens reduction programs and benefits of Government to Business interactions using E-Governments and it gives us a brief overview of basic connotations of Government to Business relationships. Further on we introduced country analysis of Estonia, and case studies of historical development of E-Government services in Estonia and, tech-based programs such as Hack the crisis and Suve application, in order to fight against global pandemic combined with their existing infrastructures of E-Government and how this transition was smoothly helped to overcome the potential backlashes in international and national level, followed with in-depth analysis of Estonian Digital Signature and E-Residency programs –with location free and once-only safe signature - how Estonia is successfully using Digital Government in the all level of interactions and successfully made it their export product, improving their GDP and reducing administrative

burdens, costs by helping businesses and companies to internationalize and eventually on the way to achieve the Digital Single market in the European Union.

Finally, based on the hypotheses stemmed upon during our research, we run panel data regression and it highlights the country's population and immigration correlates negatively to the advancement of E-Government usage and country with a high trust in their digital privacy, widely penetrated broadband network and favorable business condition, education level, as well as the previous knowledge of digital services, are positively affecting the usage of E-Government. With the quantitative analysis of Standard Cost Models, we have chosen starting a new business services in accordance with our main theme of the thesis and we confirmed that Estonia has been reducing administrative burden and costs successfully since the introduction of their own initiative of E-residency since 2014 it was 83% reduction, and between 2016 - 2020 it was 20% reduction.

The research showed that E-government is still in the development phase and smart usage of E-Government in the Government to Business interactions could, not only reduce the administrative burdens and costs but also helps small-medium enterprises to globalize and eventually to achieve the European Union initiative of the digital single market. There are still rooms for improvement in most sectors, however, using the success story of Estonia, other countries could save time, money, and resources to achieve better regulation programs and help businesses to internationalize using E-Governments.

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