Bahar Asgarova

E-Government Technology Transfer Project from Developed to Developing Countries. A Case Study of the Implementation of the ASAN Imza (Mobile ID) in Azerbaijan

Master Thesis

at the Chair for Information Systems and Information Management
(Westfälische Wilhelms-Universität, Münster)

Supervisor: Prof. Veiko Lember

Presented by: Bahar Asgarova
Roosikrantsi 21
10119 Tallinn
+372 539 01433
basgarova@uni-muenster.de

Date of Submission: 2021-08-09

Content

Figures

Tables

Abbreviations

E-ID	Electronic Identity
ETM	e-Government Transfer Model
EU	European Union
FDI	Foreign Direct Investment
ICT	Information and Communication Technologies
IS	Information Systems
IT	Information Technology
ITTLCM	Information Technology Transfer Life-Cycle Model
ITU	The International Telecommunication Union
MNC	Multi-National Corporation
MNO	Mobile Network Operators
Mobile ID	Mobile Identity
NCSC	National Certification Services Centre
NIST	National Institute of Standards and Technology
OECD	Organisation for Economic Cooperation and Development
PIN	Postal Index Number
PKI	Public Key Infrastructure
PPP	Public-Private Partnership
SIM	Subscriber Identification Module
TAM	Technology Acceptance Model
TOE	Technology Organization Environmental factors
TOT	Technology of Transfer
UN	United Nations

1 Introduction

Governments around the world have started to use information and communication technologies (ICT) in the provision of their services in order to create a safe and convenient electronic environment for their citizens and businesses. The usage of mobile communication technologies or information technologies in the public sector has established a name of 'e-government' (Dawes, 2008). This has also stimulated the diffusion of e-government projects worldwide (Heeks, 2005). However developed countries, particularly those who were capable to invest in necessary technologies, were the leaders in the creation of e-government projects (Chadwick & May, 2003) while developing countries either followed or copied those initiatives from more advanced countries (S. M. Lee et al., 2005). Therefore, governments of developing countries have accelerated the transfer of know-how and technology from other countries (Avgerou & Walsham, 2017; Cavalheiro & Joia, 2014; Chadwick & May, 2003; Chen et al., 2006; Juma et al., 2005; S. M. Lee et al., 2005; Lind, 2020; Mkude & Wimmer, 2015; Sæbø, 2012; United Nations Publications, 2020); however, the transfer of important technologies from developed to developing countries most of the time have not met the expectations of the stakeholders and ended up with the failure of the projects in the implementation phase of it (Heeks, 2002a; Mates et al., 2013). So, little is known about the successful transfer processes of e-government projects from developed to developing nations in the technology transfer (TT) literature.

As an example of e-government projects, electronic identity (e-ID) solutions have become absolutely paramount because it is a foundation to access any government services in a virtual world. E-ID solutions are a significant part of e-government system for the secure functioning of it (Lentner & Parycek, 2016; Rössler, 2008; Tsap et al., 2017). While there are a number of solutions to e-ID concept, the mobile identification (mobile ID) technology has obtained an emphasis among the developing countries since it allows them to skip establishing very complex and costly network infrastructure (International Telecommunication Union (ITU) & Ministry of Digital Affairs of the Republic of Poland, 2017). Likewise, the statistics show the increase in the number of mobile phone subscribers (8 million) and mobile phone penetration rate (99%) worldwide in 2019 (Statista, 2019), as such mobile ID is considered the secure authentication method to access the governmental services and to strengthen their e-government systems in an electronic environment. However, despite the growing importance of the mobile ID

technology for developing countries, the e-government TT literature is still silent on the transfer processes of the mobile ID technology. As such, the author has realized the lack of study on the e-government TT phenomenon including the mobile ID transfer from developed to developing nations.

To this end, the author addresses the above-mentioned research gap by investigating the topic of the e-government TT in a specific area of Azerbaijani government, namely the ASAN Imza (mobile ID) project which is based on the transfer of know-how from Estonian MNC and its partner companies to Azerbaijani mobile ID service provider and the State Tax Service under the Ministry of Economy. The author aims to answer the following research question in order to close the research gap, and the subsequent sub-questions guides the results of this thesis:

"What does the ASAN Imza (mobile ID) technology transfer project from Estonia to Azerbaijan tell us about the e-government technology transfer from developed to developing countries?"

- What elements were present in the process of technology transfer of ASAN Imza (mobile ID)?
- How did these elements interact with each other during the different stages of technology transfer?
- What technological, organizational, and environmental factors mediated the transfer process of ASAN Imza (mobile ID)?

Fundamentally, this thesis depicts an exploratory single case study of the ASAN Imza (mobile ID) project that happened in 2013 that has distinctive size and timeframe. Although the single case studies are criticized for its inability to generalize the findings, it does provide an extensive and in-depth analysis of the case. The exploratory single case study method is chosen because of the novelty of the TT and mobile ID concepts. The mobile ID TT is still a fresh phenomenon and a highly relevant topic, especially for developing countries, and TT from Estonia to Azerbaijan is one of the few cases of mobile ID TT; thus, a single case study is the best suited. For more extensive and in-depth analysis of the ASAN Imza (mobile ID) project, the unit of analysis is the collaboration of the private organization and the governmental tax agency responsible for the whole

ecosystem of the mobile ID in Azerbaijan. To this end, the research question is constructed rather more broadly to better understand all the relevant elements and phases/stages of the e-government TT processes. Likewise, although technology is instrumental for e-government technology transfer, technological approach alone fails to acknowledge its role in renovating the social setting of government. At a deeper level, e-government technology transfer involves important and substantial interactions among technology, organizational and environmental factors. Therefore, these factors are analyzed in the transfer process of project for this thesis.

A systematic literature review is executed to answer the research question by following the methods described by Webster and Watson (2002). Semi-structured interviews and document analysis are chosen as the data collection methods. Interview questions are formulated based in the information gained from literature. MAXQDA tool is utilized as a qualitative data analysis method after the transcriptions of the interviews, and the coding of the interviews is executed following the sub research questions of this thesis. The future research can utilize the findings of this thesis and go deeper to the e-government TT processes of different countries. This thesis can help other researchers by utilizing the findings in the multiple-case study of e-government TT. Policymakers, researchers, and different international and multi-level practitioners of e-government TT can learn from this thesis.

The paper is structured as follows. The introduction chapter is followed by the literature review chapter which is further divided into the broader context of the e-government TT from developed to developing countries, the mobile ID as an e-government TT project and understanding of e-government TT through socio-technical system's view. Next, the research methodology chapter describes the design of this research. Following this, a case study results are presented in the case description chapter. Afterwards, the results of the qualitative analysis are described as the elements, phases/stages and technological, organizational, and environmental factors included in the ASAN Imza (mobile ID) TT project. The discussion of the results is depicted and related to the literature together with the research limitations and potential future research.

2 Literature Review

2.1 Technology Transfer between Developed and Developing Countries

2.1.1 E-Government in Developed Vs. Developing Countries

Governments have started to use information and communication technologies (ICT) in the provision of their services over the Internet since 1990s. Likewise, businesses have benefited from the utilization of technological innovations for effective and efficient delivery of their services, and for cheaper communication with their clients (Devadoss et al., 2003). These changes evoked citizens' expectations from government towards more interactive services. Initially, governments have used technological infrastructures to overcome the limitations of bounded rationality in the organizations. Technological tools were seen as a peripheral device to create managerial effectiveness of the government officials (Devadoss et al., 2003). However, recent focus has changed the use of technologies to facilitate the government service delivery for citizens or businesses (Yildiz, 2007). In other words, the main idea has shifted from the mere use of technologies for less paperwork to the more interactive government and citizen engagement (Belanger & Carter, 2012; Yildiz, 2007). Hence, the use of mobile phones or technologies in the public sector has created a new term of "electronic government (e-government)" (Dawes, 2008). E-government could be defined as the use of ICT with the end goal of transformation to provide better services, to create effective relationship management and to help citizens and private sector organizations to grow economically and socially (Grant & Chau, 2005).

The use and implementation of e-government applications has increased across the globe because these projects aim to improve the service provision via more responsive and adaptive projects that focus on the citizen expectations (Angelopoulos et al., 2010). As stated by Gil-García and Pardo (2005), by using ICT governments can alter the structure of the organization and enhance the quality of the services. They explained the benefits of technology in the public sector as follows: (1) ICT help governments to grow operationally by cutting the costs and improve the effectiveness; (2) ICT help to improve the quality of services provided by government officials (Gil-García & Pardo, 2005). Dawes highlights the benefits of e-government projects as the enhanced government services, qualitative and cost-effective government administrative operations, citizen

engagement in democratic processes and administrative or institutional reforms (Dawes, 2008).

As such, different government and non-governmental organizations in both developed and developing nations have heavily invested in the ICT in the service provision 8/9/2021 7:44:00 AM. The concept of developed and developing countries could be defined differently in the literature. Developing countries are usually understood as the countries who do not enjoy the same level of economic growth, standard of living or human development index as developed countries (Majaski, 2020). It could also be referred to the e-government maturity levels of countries where developed countries are the pioneers in e-government applications and developing countries are the latecomers and followers (Chadwick & May, 2003; Chen et al., 2006). As such, the focus of this paper regarding the developed and developing countries is the latter.

According to the United Nations (UN) E-Government Survey (2020), e-government development has increased in both developed and developing countries. It is especially huge accomplishment to see e-government development index has transformed to high and very high e-government development index values in the governments of least-developed, landlocked developing countries and other special situations countries. However, while Denmark, Korea and Estonia are at the top of the e-government development ranking, developing countries still face difficulties in the existence of technological infrastructure, resources, and skilled human capital in the context of e-government. As such, while e-government development is in the very high level for developed countries, it is relatively fresh phenomenon in the developing countries' agenda (United Nations Publications, 2020).

Likewise, as stated by Chadwick and May (2003), technologically advanced Western countries, especially those who were able to invest on necessary technologies, were the first movers in the creation of the e-government ideas and technologies. Countries like US, UK, Canada, Australia and European countries have initiated the use of information technologies (IT) in the government services since 1990s (S. M. Lee et al., 2005). Thus, developed countries are seen as the leaders of e-government projects while developing countries follow and learn from the leaders (S. M. Lee et al., 2005).

Moreover, to develop and implement ICT or e-government projects are not the easy and straightforward processes since technological infrastructures, human actors and organizational changes have to be adapted with organizational structures (Yildiz, 2007). The combination of these factors influences our understanding of e-government functioning. Those governments who fail to take into account the basic technological artifacts, organizational culture, and other institutional variables would have difficulties to benefit from ICT related projects, and e-government projects in particular (Yildiz, 2007). As such, literature shows that even developed countries' most of the ICT related projects fall into the total or partial failure category (Heeks, 2002a). Avgerou and Walsham (2017) have confirmed that the ICT related projects usually end up not fulfilling the expectations in most of the cases. Stanforth (2006) has also approved that ICT projects incline to fail rather than succeed. Heeks (2002a) claims that the situation is even worse for the developing countries since they lack the necessary skills and infrastructure and, as such, failure rates are even higher in these countries. Therefore, government organizations try to understand and overcome the challenges brought by the development and implementation of e-government projects. Managerial, political, legal, financial, and other institutional variables are taken as imperatives in the development and implementation of e-government projects (De Vries et al., 2016; Ghobakhloo, 2012; Luna-Reyes et al., 2012; Müller & Skau, 2015; Schedler et al., 2019).

Nevertheless, since there is a clear difference in the maturity levels of e-government projects of developed and developing countries, developing countries mainly rely on the transfer of knowledge or technology from developed countries when they apply innovations in their government institutions (Avgerou & Walsham, 2017; Cavalheiro & Joia, 2014; Chadwick & May, 2003; Chen et al., 2006; Juma et al., 2005; S. M. Lee et al., 2005; Lind, 2020; Mkude & Wimmer, 2015; Sæbø, 2012; United Nations Publications, 2020). As explained by Heeks (2002a), there might be a number of reasons to explain the domination of developed countries in the development of ICT related projects. One could see developed countries as more invested in the ICT related research and development; or they could be the first movers and capable of investing in the ICT projects than developing countries; or they could be the one who provides resources and facilities to developing countries (rather than between developing countries) because of the politics of help (Heeks, 2002a). Moreover, developing countries do not have enough capital with its insufficient technical staff and knowledge, cultural barriers, and lack of infrastructure

to develop and implement strategies for e-government services (Chen et al., 2006), and since they understand the growing potential of ICT's role in the growth and social conditions of developing countries, many governments firmly invest in the technology transfer efforts from more advanced and leading countries (Avgerou & Walsham, 2017). It is also important to help less developed countries by "the sharing and transfer of expertise, experiences, design approaches and solution" to keep them motivated in the implementation of e-government projects (Mkude & Wimmer, 2015, p. 1). As such, developing countries usually rely on e-government research and knowledge developed by the advanced nations (Lind, 2020; Sæbø, 2012).

The direct transfer of technology or knowledge from developed to developing countries cannot simply happen without considering the institutional, cultural or administrative factors (Mkude & Wimmer, 2015; Schuppan, 2009). Mates et. al. (2013) state when developing countries get help with the transfer of knowledge or technology from developed countries, they expect the same favorable effects of e-government projects in their contexts. However, according to their review of literature, e-government projects have partially or fully fail in the implementation phase of developing countries (Mates et al., 2013). As also mentioned by Reddy and Zhao (1990), transferring technology from one country to another country is not as simple as purchasing the capital assets, and it requires investment in adaptation, adoption or improvisation of technology to local contexts.

In sum, there are different ways to define developed and developing countries, but the author uses e-government maturity levels of countries as a measure in this research. Since the economic distinction (of developed and developing countries) would be too broad for this thesis, the author does not mean countries who are economically wealthy or poor, or democratically advanced or not, but rather those who are the vanguards of e-government projects and those who get aid in terms of technological infrastructure or knowledge from those more advanced nations.

To better understand the technology transfer from developed to developing countries the concept of TT, mechanisms, and processes of it are explained in the next section.

2.1.2 **Conceptualization of Technology Transfer (TT)**

Technology Transfer (TT) is a complex process of transferring established experiences from one place to another, and it is viewed as a necessary phenomenon to deal with the challenges of diffusing external technologies in the organizations (Gupta & Govindarajan, 2000). The concept has gained a lot of interest by academics, researchers, government officials and so on because TT have the potential to bring economic benefits, better standards of living and social life (Reddy & Zhao, 1990). Since organizations realize it is insufficient to only rely on the in-house experiences, TT is a valuable phenomenon for them. It is a process of learning from each other's experiences, which may occur among universities, governments, or businesses. Therefore, successful implementation of TT is important for all stakeholders since it may bring competitive capabilities and resources from external sources (Wei Choo & Johnston, 2004).

TT can be divided into different categories; however, given the vastness of the TT literature, the focus of this paper is particularly on the international TT in which transfer occurs across countries. More specifically, TT from developed countries to developing countries which has been a main focus of technological change processes since 1960 and 1970s is the unit of research (Bozeman, 2000; Juma et al., 2005).

According to the literature, the traditional perspective of seeing TT as exchanging the technology from North to South has gradually changed to more nuanced and complex interaction between countries (Juma et al., 2005). In 1970-80s, the focus of mere adoption of technology has shifted to thinking of innovative ways, mechanisms or channels for transferring the technology (Heeks & Stanforth, 2015). With this view, the technology was no longer seen as just a technological artefact but as the package of human actors, processes, organizational arrangements and technology (Bell & Albu, 1999).

The list of definitions of TT is enormous. Two of them is included below:

> "*Technology transfer is the process of sharing of skills, knowledge, technologies, methods of manufacturing, samples of manufacturing and facilities among governments and other institutions to ensure that scientific and technological developments are accessible to a wider range of users*" ("Technology Transfer," 2021; Hilkevics & Hilkevics, 2017, p. 541).

> "*Exchange or sharing of knowledge, skills, processes, or technologies across different organizations*" (Hilkevics & Hilkevics, 2017, p. 541).

A number of TT models are discussed in the literature some of which are 'appropriability model', 'dissemination model' or 'knowledge utilization model' (knowledge management perspective) (Choi, 2009; Gibson & Smilor, 1991). The appropriability model was established around 1945-50s, and its advocates believe that the mechanisms to find the correct way of TT are unimportant since good technologies would ideally sell themselves. Secondly, the dissemination model was the by-product of 1960-70s, and it underpins the idea of innovation dissemination through expert and non-expert cooperation. Last but not least, the knowledge utilization model/knowledge management perspective which is also the most recent model, began to understand the more nuanced and complex nature of TT, and it supports the strategies, such as interpersonal communication between different stakeholders, that should be built in TT process (Choi, 2009; Gibson & Smilor, 1991). Another research by Mansfield et. al. (1982) explain information exchange under three categories of material, processes and capacity. They explain material transfer as the transfer of technological artefacts, equipment, tools, or even plants. Transfer of designs, know-how, or capabilities fall under the process transfer phenomena. Capacity transfer includes the transfer of skills and capabilities to adapt the existing technology (Mansfield et al., 1982).

To dive deep to TT concept, one should also understand technology concept itself. From a knowledge management perspective, technology comprises material things, processes or knowledge. (Frey, 1987 as cited in Cavalheiro & Joia, 2014). When explaining technology, it is crucial to see it as a knowledge system rather than material infrastructure (Juma et al., 2005). So, these authors believe technology can be regarded as knowledge through the knowledge management perspective, and TT embraces transfer of technology, technical information, and know-how across different organizations (Kogut & Zander, 1992).

Likewise, Gupta and Govindarajan (2000) claim that TT is not merely buying and selling the technological artefact, and it is more than that. As Dudley (2006) states, technical capabilities in the TT process are critical but cannot stand by itself. So, working relationship of relevant stakeholders is of paramount importance (Dudley, 2006). In other words, the inclusion of both donor and recipient organizations in TT process is of vital

importance as well. For example, Choo and Johnston (2004) highlight the active role of the recipient organization in TT process. When internalising the external resource, the recipient organization should be actively engaging in the acquisition of the new technology and the market (Wei Choo & Johnston, 2004). Likewise, the success of TT projects depend on organizational strategies of the donor and the recipient organizations, as well as technological capabilities of the recipient (Ramanathan, 2001).

Heeks (2005) claim that TT projects can bring socio-economic development to countries or performance improvements to firms, however TT process usually ends up with the failure of the projects. TT projects often fail to accomplish the expected benefits because the developers of the project usually do not take into account the cultural or country-specific characteristics of the recipients (Heeks, 2005). Khabiri et. al. has also stated that TT would end up with the failure or mere acquisition of technological artifact if no contextual considerations will be taken into account (Khabiri, Rast, et al., 2012). Bozeman (2000) acknowledges this idea that transferred technology in the TT process is not important enough, but rather know-how of technology use and application is more crucial. Jegathesan et al. (1997) have also claimed that TT to developing countries usually fail because these countries are not ready to implement the sophisticated technological infrastructure designed in developed countries. Developed countries or multi-national corporations (MNC) transfer inappropriate technology to developing countries while developing countries do not have enough skilled labour and physical capital (Madu, 1989).

Bozeman et al. (2015), on the other side, mention five elements that they see as the important determinants for the effective TT. These elements are:

- characteristics of the transfer agent,
- characteristics of the transfer recipient,
- characteristics of the transfer media,
- characteristics of the transfer object,
- demand environment.

These elements are explained as who is doing the transfer, how are they doing it, what is the transfer object, and to whom it is being transferred (Bozeman et al., 2015).

Khabiri (2012) has also identified eight elements for the effective TT process which are

- transferee,
- transferor,
- technology,
- mechanism of transfer,
- the transferor environment,
- the transferee environment,
- the greater environment.

Khabiri et al. (2012) have identified **transferee and transferor** as an individual, a company, or a country in which the transfer process happens. Khalil (2012) has also explained that technology transfer could happen between countries, regions, industrial sectors or firms. Then, **technology** is understood as a tool, process, methods and all the knowledge according to Khabiri et al. (2012). Then, the recipient organization should be the one who chooses the **mechanism of transfer** for the flow of technology from the donor to the recipient organization (Khalil, 2012). What is important for this research is the modes or mechanisms of technology transfer, or in other words, how technology is being transferred from one country to another country. Planned channels mechanism is explained as the exchange of information with the consent of the transferee and the planned processes. This mechanism has several types such as licensing, joint venture, turnkey project, foreign direct investment (FDI) where the transferee has certain type of access to the transferor's technology accordingly (Khalil, 2012). Licensing is explained as the acquisition or purchase the rights of technology from the donor organization to utilize it, while joint venture which was also termed as 'global technological collaborations' by Juma et al. (2005) happens through the combination of interests of different organizations by sharing the knowledge and resource/facilities to come up with a product, a service or by using their know-how to help each other. Turnkey projects are

the ones where the complete ready to use projects are bought by the recipient countries, and the continued trainings or support might be required from the transferor side (Khalil, 2012). Last but not least, multinational corporations usually sell their technological products or knowledge (through licences), and create their entities in the foreign markets (through FDI) (Jegathesan et al., 1997; Juma et al., 2005; Khalil, 2012; Madu, 1989; Reddy & Zhao, 1990). These corporations keep their national identity and sell their technologies in different countries. The FDI projects have positive returns for both MNCs and the recipient country since corporations might get access to the foreign markets and benefit economically and technically, and since the recipient countries might enjoy the technological know-how and trainings, employment opportunities for its constituent (Khalil, 2012; Reddy & Zhao, 1990).

Derakhshani (1984) has talked about the environmental characteristics of the recipient and the donor that would lead to the desirable or undesirable transfer conditions. These characteristics include the proximity of the recipient and donor in terms of technological infrastructure, human labour and their skills, working culture and organizational structure, the mind of people, and governmental rules of the recipient (Derakhshani, 1984). So, Derakhshani (1984) has already included the **transferor environment, the transferee environment, and the greater environment** concepts of Khabiri (2012) into the environmental characteristics of the recipient and the donor.

Juma et al. (2005) also acknowledge that the FDI will continue to be the source of knowledge transfer in which development of technological artefacts are based on. However, what developing countries' governments should ensure is to provide policies and regulations for the stimulation of more TT and the creation of local capabilities. They should also maintain their responsibilities for the establishment of legal norms, or regulations while reduce their role as the producer of the technology (Juma et al., 2005). One should also bear in mind that above mentioned elements of TT processes are developed based on the private sector contexts.

According to the paper written by Ibrahim, the TT life cycle has three phases of:

- Pre-Technology of Transfer (Pre-TOT),
- Technology of Transfer Implementation (TOT Implementation) and,

- Post-Technology of Transfer (Post-TOT) (Ibrahim, 2006 as cited in Ibrahim & Kasimin, 2010).

The first phase, pre-TOT, has one of the most important activities since the failure of the transferred project heavily depends on it (Ibrahim & Kasimin, 2010). This phase includes the initial assessment of existing situation and the decision to obtain technology, examination of relevant technologies and technology providers, and so on. After the selection of a proper technology TOT implementation phase comes in, which includes technology purchase and installation, assimilation and use, adaptation, and maintenance. Post-TOT, on the other hand, is about the diffusion and innovation of technology (Ibrahim & Kasimin, 2010).

Every phase of TT embraces different stakeholders interacting with each other to accomplish their goals. As mentioned by Ibrahim and Kasimin (2010), these stakeholders can be human or non-human elements. Human elements are the recipient or donor organization, employees, trainees, users, service providers and so on, while non-human elements are technological artefacts, machines, policies, strategies, or culture. As such, the trajectory of the transferred technology is influenced by the interaction of these stakeholders. However, TT does not explicitly clarify how the interaction should be guided at every phase of the process for the successful TT; therefore, this paper applies technological, organizational, and environmental factors as the contextual distances of the donor and the recipient organizations to analyse and examine the TT processes from each phase.

2.1.3 **E-Government adoption as a form of TT**

E-government is one of the many projects of TT which takes technology designs from one context and applies to another country context, and it is considered as a complex TT process with the consideration of two country contexts (Cavalheiro & Joia, 2014; Heeks, 2002b). Transferring technology within the firm's different locations or departments is a challenging and complex process, so it is even more complicated for the transfer of technology across countries (Gibson & Smilor, 1991). Likewise, every e-government system is diverse and, it is seen as a 'socio-technical' system in which both technical and social factors make up the whole information system (IS) (Heeks, 2006). Therefore,

organized collaboration and cooperation between stakeholders of two countries or international organizations shall be ensured in e-government TT process (Heeks, 2002b).

The author talks about e-government TT in this research because developing nations' public sector organizations are more and more relying on the knowledge and expertise of the developed countries, e-government projects in particular (Heeks, 2005). As mentioned before, the initiation to put everything online in the public sector is made from the Western countries side, and they enjoy the benefits of being the first mover, while developing countries (latecomers) try to follow or copy the success stories of those already applied (Chadwick & May, 2003; Chen et al., 2006).

Number of scholars have researched the e-government TT under the name of IT transfer. For the sake of simplicity, the author uses e-government TT throughout this paper.

The use of ICT has accelerated the implementation of e-government projects worldwide (Heeks, 2005). E-government projects have also arrived in the developing countries, however there is a huge gap in the implementation of e-government projects between the developed and developing countries. As cited by Heeks (2005), only few countries such as US, UK, Canada and Singapore are the pioneers of e-government projects, but the developing countries could only invest a limited amount in the e-government projects.

E-government TT is understood as a complicated phenomenon. There has been a huge number of IT transfer from the Western world to developing nations, however it has been mainly concluded with the failures of those projects because of the insufficient consideration of contextual dimensions (Baark & Heeks, 1999; Derakhshani, 1984; Hagood, 2006; Jegathesan et al., 1997). It is especially a big failure when the technological cooperation or technology transfer happens without considering the developing countries' local conditions in the design phase of e-government (Heeks, 2005). Heeks, therefore, talks about 'design-actuality gap' which explains the shortage of IS design and the local actualities of the developing countries which in turn lead to the failure of the e-government project (Heeks, 2002a). It is also found that most of the e-government strategies in the IS literature are proposed from the developed countries' experiences which may not be applied to developing countries (Chen et al., 2006). Likewise, Chen et al. (2006) found that developing countries lack the necessary elements to build a successful e-government strategies which includes the capital, knowledge and

skills. Thus, it presents a need for the e-government TT from the perspective of the developing nations.

An example of e-government TT where it usually ended with partial or total failure would be Stanforth's study on the e-government fiscal reform program in Sri Lanka with the assistance of international financing institutions, and he has found the importance of the incremental improvisations to the organization or country specific issues (Stanforth, 2006). Cavalheiro and Joia have examined the e-government TT in Brazil, the case of European Patent Management System, where the improvisation of original project design, active participation of the recipient country and flexible implementation strategies were required (Cavalheiro & Joia, 2016). Heeks (2002b) has researched the failure of the e-government TT in African case as a result of the 'design-actuality' gap of the two contexts. Another example would be TT programme from developed countries to Malaysia where authors examined the structure of transfer processes (Ibrahim & Kasimin, 2010).

All these examples present that the developing countries still have difficulties in developing or designing successful e-government projects, therefore they tend to transfer the e-government technologies from the developed nations. As such, e-government TT is both a necessary instrument and a huge difficulty for the e-government practitioners and researchers. The literature also shows that existing literature mainly focuses on the e-government strategies developed by the experiences of developed countries, lacking the perspective of developing countries. As such, it would yield valuable insight for practice to look at the e-government TT from developing countries' perspective.

Different models of TT (as mentioned in the previous section) are established by the researchers where they explain the important steps for the successful TT process. These steps are planning (Bar-Zakay, 1971; Jagoda, 2007), assimilation and use (Baark & Heeks, 1999), adaptation (Cutrell, 1990), adoption (Cutrell, 1990), diffusion and innovation (Baark & Heeks, 1999), evaluating contextual differences (Dawes et al., 2012), and planning of unexpected events (Choi, 2009) in the transfer process.

However, there is a lack of literature on TT models that comprises e-government or IS projects in it. Cavalheiro and Joia (2014) analysed TT models that are from knowledge

management perspective and found that these models do not consider the characteristics of the specific e-government technology nor specific IS characteristics.

The models from knowledge management perspective do not mention the need for a new technology in their dimensions. However, they all have one commonality of transferring technology from one country to another country and taking the different local context of the donor and recipient organizations. The authors' analysis showed that there is an immediate need for an e-government TT model, hence they proposed an integrative model which draws on e-government and knowledge management perspective of TT models. The model is called e-Government Transfer Model (ETM) which is also advancement of Information Technology Transfer Life-Cycle Model (ITTLCM) proposed by Baark and Heeks (1999) (Cavalheiro & Joia, 2014). ITTLCM model was formulated as a simple donor-funded e-government TT model because of the pressing need of understanding e-government TT. The model was created based on four Chinese science and technology projects, with the focus of e-government TT from the developed to recipient country. As cited by Cavalheiro and Joia (2016), this model was not formulated and compared with the existing TT literature, therefore it lacked the aspects of the recipient organizations' perspectives. Hence, because of the limited amount of literature that talks about e-government TT this paper mainly utilizes ETM. Likewise, it is an integrative and comprehensive model based on the comparison of existing TT models.

The analysis of five TT models from knowledge management literature and ITTLCM has given authors to elaborate and find out lacking elements of TT process in the existing models. The important aspects of successful TT projects such as "*unexpected changes to plans, the technical capability of the recipient organization, and the evaluation of the project*" are incorporated to the ETM, and as such the framework is explained as the circular process of transfer of the e-government technology (Cavalheiro & Joia, 2014, p. 202). The model includes 9 stages in the e-government TT process: (1) Perception of Problem, (2) Choice of Technology, (3) Purchase and Installation, (4) Technological, Managerial and Organizational Capabilities of the Recipient, (5) Adaptation, (6) Adoption, (7) Diffusion and Innovation, (8) Feedback to Donor, and (9) Unplanned Elements.

This model puts the Unplanned Elements level in the centre where all the other stages are interlinked with it. It basically explains that unexpected changes might affect all the other

stages throughout the TT process. The model also includes both the donor and recipient organizations in all the stages of e-government TT process because it is seen as a collaboration or cooperation.

As mentioned earlier, e-government TT stages include complex processes among different actors. The involvement might be among social, organizational, and technological artifacts of the organization. As such, success of the TT processes might be influenced by the interactions of human agencies and non-human elements. The TT concept does not explicitly explain the correct way of interaction of humans and non-human elements for the efficient and effective transfer; therefore, the author uses 'socio-technical system' to explain and interpret the role of technology together with the human agencies in the organizations. This will be explained more in the coming chapters.

2.2 Mobile ID as an eGovernment Technology Transfer Project

2.2.1 Mobile ID in the Broader Context of E-ID

Today most of the governments around the world and citizens benefit from the e-government projects, while globalization, increasing social mobility and omnipresent nature of the ICT tools in our everyday life create the requirements for new the e-government solutions, electronic identification solutions in particular (de Andrade et al., 2014; Rössler, 2008). Accordingly, electronic identity (e-ID) is considered as an inseparable part for the secure functioning of and the cornerstone of the e-government applications (Lentner & Parycek, 2016; Rössler, 2008; Tsap et al., 2017). It helps governments to provide their e-government services in an efficient, secure, and trusted way (Melin et al., 2016). It is also believed that the e-government project adoption is positively affected by the existence of the e-ID system (Mir et al., 2020).

E-ID has its roots on the *identity* concept. *Identification* – People can be identified through the use of personal information such as their names, the date and place of birth, gender and so on. E-ID, in turn, would be the use of personal information to prove who they say they are in the digital world (van Thanh et al., 2012). Since identifying oneself for all the legal interactions and transactions for the social, economic and political opportunities is of greatest importance, e-ID is a prerequisite for the secure authentication and identification to government services (Krimpe, n.d.; Melin et al., 2016).

According to the study conducted by Deloitte for the European Commission (2020), e-ID is an important foundation for the governments to create user-centric services since citizens can be authenticated securely with the e-ID solutions. European Union (EU) member states (Collings, 2008; Deloitte, 2020) and many other governments (Hölzl et al., 2018; Rössler, 2008) have already invested in the e-ID solutions in the provision of their e-government projects. The initial e-ID solutions included the use of smartcards, e-ID cards, USB tokens or mobile-ID where citizens use their different tools to access the public services. However, the smartcards usually require card readers which limit the users to personal computer owners (Deloitte, 2020). As such, lack of ease of use and user acceptance factors have made the smartcard e-ID solutions unfavourable. Likewise, there have been numerous concerns of privacy and security regarding the national e-ID card or smartcard solutions (Eaton et al., 2018; Hölzl et al., 2018; Melin et al., 2016; Wu et al.,

2015). Nevertheless, those countries who give access to their citizens to use e-ID cards for the public services have presented that e-ID has to be taken as a priority when building an e-state (Tsap et al., 2017).

With the growing privacy and security concerns for the existing national e-ID card and smartcard solutions, researchers have proposed an alternative e-ID solution, mobile ID (Hölzl et al., 2018; Wu et al., 2015). Likewise, to overcome the challenges brought by the smartcard solutions the mobile ID solutions are established by many countries (Zefferer & Teufl, 2015). Research has shown the growth in the use of mobile technologies for both developed and developing nations (OECD & International Telecommunication Union, 2011). Contemporary world is becoming mobile; therefore, governments are heavily focusing on the mobile ID solutions and 'mobile-first strategies' as one of the projects of e-ID. The advancements in mobile communication technologies helped the government agencies to reach out to a much greater audience with new platforms, and assisted citizens to communicate in a more convenient way and access public services with less time and space boundaries (OECD & International Telecommunication Union, 2011). It is also called 'm-government' in the literature which is defined as "*an extension or evolution of e-government through utilisation of mobile technologies for public service delivery*" (OECD & International Telecommunication Union, 2011, p. 18). Use of mobile communication technologies in the provision of public services has positive impacts for (1) governments and (2) citizens, and on (3) national economic growth accordingly. Some of them include (1) cost-efficient service (better communication and data sharing in the organization), bigger audience (wider reach with mobile phones), expanded service delivery (access to services anytime and anywhere); (2) easy access to government services, ability to get services in health and public safety, education or financial management sectors; (3) faster wireless networks and better application platforms for businesses (OECD & International Telecommunication Union, 2011).

According to the report of Organisation for Economic Cooperation and Development (OECD) and ITU (2011), the mobile communication technologies are comparatively less expensive and easy to use. 90% of the world population has access to the mobile devices. As such, the increase in the use of mobile technologies for information and services create a need for the mobile services by the governments (OECD & International Telecommunication Union, 2011).

The importance of the sound identity system should be highlighted since public agencies cannot provide health, education or financial-related services without a secure identity system. As such, it is noted that a national identity system is required for the development and sustainability of the society. Since the world is more dependent on mobile communication technologies, and identity management is important for the secure communication between governments and citizens, the mobile ID technology would be the perfect solution.

Mobile ID comprises the integration of the mobile devices with e-ID, enabling technical devices to authenticate the person's identity. Mobile ID is also understood as an extension of digital identity which may be used in the certification process of a person in changing devices, locations or contexts (van Thanh et al., 2012). Another definition of mobile ID is stated by the Estonian government as a use of mobile device as a complementary part of secure e-ID (e-Estonia, n.d.). Van Thanh et al. have provided another definition of mobile ID with the focus on developing countries: It "*is defined as the concept of making use of mobile communication in the establishment, development and protection of citizen identity*" (van Thanh et al., 2012, p. 135). So, the definition of mobile ID extends to the use of mobile communication technologies or devices in the identification, authentication, or verification of citizen identity, in the governmental or business service provision, and the utilization of mobile devices in the identification and authentication token.

Although the mobile ID solution is captivating concept, it should be dealt with care. It is important to take into account the following determinants for the successful implementation of the mobile ID solution at the government level: as claimed by van Thanh et al (2012), the involvement of governments, non-governmental agencies, or mobile operators for creating more integrative mobile ID solution, responding to end-user's needs and creating interoperable solutions is crucial for eliminating the challenges brought by the project.

Mobile ID is a technology that is going to be relevant for all governments. Since the mobile devices and usage of it has been increasing, using the mobile ID solutions for the identification and authentication of the citizen will become useful for governments (OECD & International Telecommunication Union, 2011). It can also enable users to vote online without visiting the polls physically. Therefore, we will see a lot of TT between developed and developing countries in the context of mobile ID. As such we need to

understand how this can be done successfully. Likewise, in order to do this, we need to look not only at the technology itself (what a lot of theories are doing) but also at organizational and environmental aspects of the TT process.

2.2.2 Mobile ID in Developed Countries

Different forms of mobile ID are available, and different nations use what is appropriate to them.

SIM based and HSM based Mobile ID

One of the many forms of identification on mobile devices is the use of subscriber identification module (SIM) cards that is based on the client-based architecture to identify and authenticate to government services online (Deloitte, 2020; Zefferer & Teufl, 2015). SIM card is a chip provided by the telecom operators. Governments use public key infrastructure (PKI) based mobile ID for the secure identification in the government websites. As stated by Deloitte's report for the European Commission (2020), SIM card based mobile ID solution is extremely secure since it does not exchange the identity information of the citizen in the internet but exchanges through SMS and back-end to mobile service providers and is authenticated by the telecom operators. While another realization form of tokens is by means of Hardware Security Module (HSM) that relies on server-based architecture (Deloitte, 2020; Zefferer & Teufl, 2015). "Key pairs and associated certificates" are stored in the HSM in which only the owner has access to it (Deloitte, 2020, p. 8). In order to get the access, the owner shall sign in using his or her personal identifier, password and an extra one-time authenticator factor (Deloitte, 2020).

According to the literature, Baltic countries, a number of Scandinavian countries and Austria were the first movers in the application of the mobile ID technologies at the national level (Zefferer & Teufl, 2015). Countries such as Estonia, Finland, Belgium, and Austria's mobile ID solutions will be discussed briefly. Estonia uses SIM card based Mobiil ID solution in which citizens are enabled to use e-services and sign documents digitally. Estonian ID card holders and Estonian residents can request SIM cards from telecom operators. PKI based SIM cards give access to the e-government application where people are authenticated (e-Estonia, n.d.). Finland's three leading mobile operators provide mobile ID platform to customers of third-party service providers to access online services (Suokas et al., n.d.). The cooperation among Belgian banks, mobile operators

and Belgian government has helped to build mobile application ‘itsme’ to offer citizens online platform to access the services. This application complemented the national e-ID card where the holders of e-ID card and resident card could use the 5-digit activation code for the creation of ‘itsme’(*Itsme*®, n.d.). Last but not least, Austria has launched Austrian Mobile Phone Signature which gives access to its citizens to authenticate themselves for both public and private sector services (Handy Signatur, n.d.).

The commonality among these examples is that all these countries use PKI based SIM cards for secure identification, however Austria relies on HSM as security token. By using HSM it aims to securely retrieve and store the identity data and implement cryptographic operations (Zefferer & Teufl, 2015).

2.2.3 **Mobile ID in Developing Countries**

A number of developing countries have also launched the mobile ID applications such as Azerbaijan, Turkey, Moldova, and Oman. The mobile ID solution is attractive to developing countries “*thanks to its ergonomics and high level of security*” (Gemalto, 2014, p. 2).

Azerbaijan has implemented the mobile ID solution (ASAN Imza) based on the Public-Private Partnership (PPP). Users are allowed to identify themselves with the SIM cards connected to certificates and to access the government services (*What Is the Asan İmza? | Asan İmza*, n.d.). MobilImza is the national level mobile ID solution that authenticates users to access the services and allow them to sign digital documents in Turkey (Vodafone Türkiye, 2021). In Moldova, government together with multiple mobile network operators (MNOs) have launched the mobile ID solution since 2012 (E-Governance Agency & Government of Moldova, 2015). Last but not least, Oman is one of the first Middle Eastern countries who established SIM based mobile ID technology and connected it to its digital ID schema (Ministry of Technology and Communications, 2019).

To sum up, the lack of security and usability factors of the smart card e-ID solutions, and the increasing use of mobile phone devices led to the favorable conditions for the mobile ID solutions (Zefferer & Teufl, 2015). According to Krimpe (n.d.), the mobile ID solution does not require any additional card readers, ID cards, or any software, and it is secure

way of authenticating users; as such, governments of developing countries are investing in it.

One of the main pitfalls of the mobile ID solution would be that governments rely on mobile operators too much, and it makes the mobile ID solution difficult to implement (Deloitte, 2020). Likewise, since the mobile ID development and implementation happens both under the control of the public and private sectors in different countries, it creates various mobile ID ecosystems, thus it is hard for practitioners to find out the best practices and follow them (Zefferer & Teufl, 2015). However, the secure operations with the help of the SIM based mobile ID should not be disregarded since it would be extremely hard to get access to and hack the mobile operator's network and person's mobile device (Deloitte, 2020). Likewise, the simplicity of the SIM card based mobile ID solutions should be highlighted since no additional equipment is required to use it (Krimpe, 2014).

2.3 Socio-Technical System – understanding the different contexts

TT is considered as a complex process as opposed to the idea of orderly and linear transferring process; this also applies to the e-government TT (Flannery & Dietrich, 2000). Likewise, the TT process includes collaboration of different stakeholders that might be from different structural units (S. Lee et al., 2018). So, involvement of different actors and structural properties in the implementation of TT might influence the trajectory of the activities. In this study, the socio-technical system view is utilized to study how interaction among people, technology and organization in the TT affect the TT process. The focus is on the analysis of the mobile ID TT processes to achieve a contextual perspective beyond the technology. A contextual perspective is important in this research because technological artefacts and organizations come into the existence when material and human agencies are imbricated, and when technology and people interaction is in focus (Leonardi, 2011; Orlikowski & Iacono, 2001).

Therefore, the author takes the socio-technical system view of e-government (technological, organizational, and environmental) in order to understand the mobile ID TT project from more contextual perspective. Since, the transfer of technology happens between two different country contexts, the heterogenous nature of two e-government systems must be noted. Thus, in order to understand the e-government as a socio-technical systems Heeks' ITPOSMO checklist will be utilized to include technological, organizational, and environmental dimensions (Heeks, 2006):

- Information
- Technology
- Processes
- Objectives and values
- Staffing and skills
- Management systems and structures
- Other resources

2.3.1 E-Government research in the context of socio-technical systems

To get better idea on the e-government TT projects, e-government project development and implementation research has been utilized. To find a correct framework for the successful design and implementation of e-government related projects in the public sector has been a long-term challenge to the public officials and researchers (Omar et al., 2016). The main factor that affects the adoption of the e-government related innovations or services in the public sector is usually because of the initiation from the political leaders who strives for the enhancement of the community services or reduction of the costs. Yet, this did not facilitate the successful implementation of the technological changes topped up with the weak planning and change management in the public sector. It has also been a huge challenge to transform digitally in the public sector because of the complicated administrational processes and structures (Omar et al., 2016).

The literature is full of studies concentrating to find the success or failure factors of e-government related initiatives in the public sector including the diffusion innovation theories, technology organization environmental (TOE) factors, Technology Acceptance Model (TAM) and so on (Angelopoulos et al., 2010; Dawes, 2008; Ghobakhloo et al., 2012; Gil-García & Pardo, 2005; C. Lee et al., 2011; Müller & Skau, 2015).

Moving beyond the idea of seeing technology as an only success factor of IT initiatives, Gil Garcia and Pardo (2005) have found main strategies for the successful IT initiatives and categorized them under five challenges of which are:

- Information and Data,
- Information Technology,
- Organizational and Managerial,
- Legal and Regulatory,
- Environmental and Institutional

The strategies for each category will be briefly discussed in this section. It is imperative to have overall data plans or quality and compliance assurance to tackle information and data challenges in the organizations. The IT related challenges can be overcome with the

system usefulness and easiness, while the organizational and managerial challenges need to be tackled with clear goals, involvement of relevant stakeholders, their technical skills and trainings, and so on. Organizations need to develop government-wide IT policies and standards to eliminate legal and regulatory problems. Last but not least, the institutional and environmental challenges require the attention of legislators, respective politicians and the strategic outsourcing techniques (Gil-García & Pardo, 2005). These findings concentrate on the success factors for the adoption of e-government projects in the public sector, while this paper has specific focus on the most important e-government TT processes in the public sector.

Likewise, while these studies are about how to successfully diffuse innovation in the public sector, the research is also done to find the relationship of the technology in the organizations. The study on the role of technology in the organizations has mostly focused on technology aspect, failing to take into account other aspects such as institutional or human aspects. Prior research has taken technology as an independent or external variable that would directly impact the organizational structure. Other realm of studies claims the adoption of technology in organization as a response to the external environment, as a product of shared interpretations of humans. The role of human actors and organizational contexts on the role of technology in organizations has been rarely brought up to the surface. The academics who support the third realm of research mentioned here believe that human actors, structures (or institutions), and ongoing interactions between these two have a vital influence in the institutionalization process (Orlikowski, 1992).

IS literature has initially conceived technology development in organizations as a technical issue (which is also called “tool view”) that has societal impacts, and researchers largely failed to take into account people’s role in the development and use of technology (Orlikowski & Barley, 2001; Orlikowski & Iacono, 2001). Two particular approaches have been stated by many researchers on the relationship of technology and organizations. These are (1) technological determinism and (2) strategic choice theories which are not the most effective approaches to explain the role of technologies in the organizational changes (George & King, 1991; Kling & Scacchi, 1982; Markus & Robey, 1988; Orlikowski, 1992; Orlikowski & Barley, 2001; Orlikowski & Iacono, 1999; Subramanian & Nilakanta, 1996). For instance, George and King (1991) does not agree with the comprehensiveness of technological determinism, that IT has the direct impact in organizations’ structures, and strategic choice theorists, that technology is initiated as a

response to external forces by organizational strategists. They instead opt more ‘ecological perspective’ saying that a number of internal and external factors interact simultaneously (George & King, 1991) .

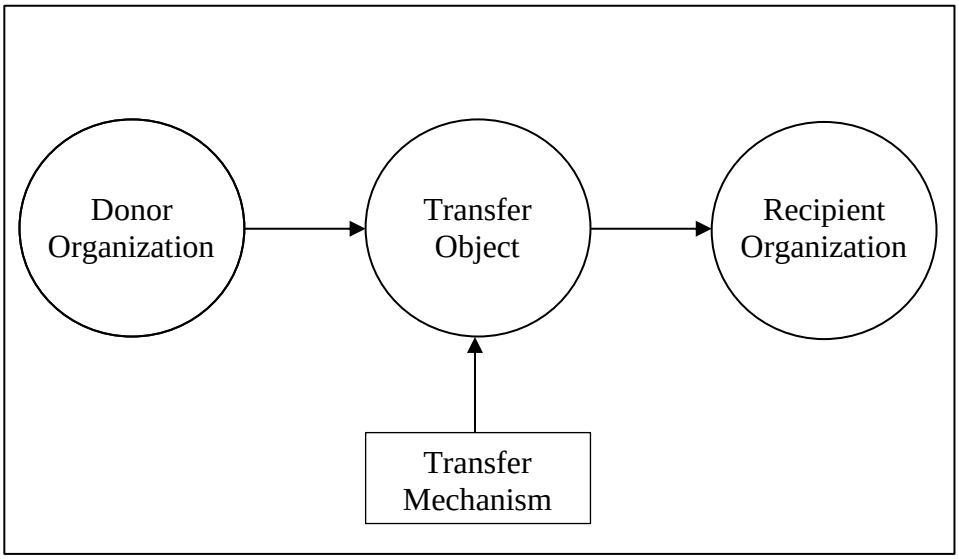
The determinists believe that they can predict the institutional changes with the help of measuring the technological changes (Attewell & Rule, 1984). For example, they try to focus on the impacts of technology on organizational or individual level such as organizational structure, its size, employees’ job satisfaction, their effectiveness and so on. So, technology is taken as an independent variable which has direct impact on human actions and organizational structures as stated by Giddens (1984). Even though the determinists provide insights into the forcing aspect of technology in the social systems, this research stream avoids the human aspect in designing, appropriating and transforming technology, therefore it is an unfinished projection of technology and its relationship to organizations (Orlikowski, 1992).

The second famous stream, the strategic choice theorists, argues the opposite idea that technology can be put to different uses by continuous human action, development and use, and in which technology is not an external variable (Orlikowski & Iacono, 1999). The strategic choice theorists believe that determining the relevant human agents’ motives and objectives is a meaningful way to forecast changes and consequences in the organizations. As such, political leaders or managers are the ones who make the strategic choices regarding technologies based on the strategic relationship of technologies to organizational properties, and regarding the right employees to use those technologies. There would be organizational outcomes based on these choices. There is another view in strategic choice theory that powerful human actors use technologies just to diminish too much reliance on human labour. Both views see the powerful human actors in the organizations as the key determinants in shaping technology to certain organizational ends not the users (Orlikowski & Iacono, 1999).

However, since 1980s, numerous authors have tried to come up with the new ideas that they perceived was lacking in the IS research. Researchers such as Markus and Robey (1988) and Kling and Scacchi (1982) have articulated alternative conceptualisations on the technology’s role in the organizations, refuting to see IS project development and implementation as a mere technical problem in the organizations. Markus and Robey explain the relationship between technology and organizations in different ways (1988).

In their analysis, technology may have three different direction – it is either external environment leads to change; or it is human agents who acts strategically and transform; or it is the combination of people and social events leading to change (Markus & Robey, 1988). Another example would be Kling and Scacchi's concept of "web models" of computing, as opposed to the idea of information technologies as a basic use of technological artifacts. In contrast, web models of computing are an "*ensemble of equipment, application, and techniques*" and human agents who shape the social context, including legacy in creating that 'web', the infrastructure for supporting it, and organizational structures that form the platform where people use it (Kling & Scacchi as cited in Orlikowski & Iacono, 2001). Orlikowski and Barley has more recently highlighted the reciprocal interaction between technology and humans, and took the technology as both "*simultaneous social and physical artefacts*" (Orlikowski & Barley, 2001, p. 149). Since the same technology can be used in different ways, every day users of technologies appropriate the implications of technologies, as well as technological properties either constrain or facilitate the human agents (Barley, 2007).

To summarize, the author utilizes and combines the elements found from the literature review as shown in figure 1. The demand environment and/or the general environment element is omitted since the author discusses the environments of the donor and the recipient organizations through the contextual distances of countries with the technological, organizational, and environmental factors that mediate the transfer process of the technology. Furthermore, the ETM has guided this thesis for identifying the stages of TT, however, once again the contextual distances stage is extensively elaborated in the technological, organizational, and environmental factors sub-chapter. Furthermore, these factors are summarized based on the socio-technical systems' view of the e-government projects.



Source: Author's compilation

Figure 1. Broader context of technology transfer of e-government projects

3 Methodology

3.1 Research Design

An exploratory single case study was chosen as a research approach to answer the research question provided in this thesis. This method was chosen because of the novel perspective on e-government TT and mobile ID concepts that this thesis focuses on. As stated by Yin (2018), the relevance of the case study research is higher when the research question seeks to explain the modern problem or requires extensive and in-depth description of the social event. The case studies are considered important in the social science research because "(…) the investigator explores a real-life, contemporary bounded system (a case) or multiple bounded systems (cases) over time, through detailed, in-depth data collection" (Creswell & Poth, 2017, p. 365). The research question is:

"What does the ASAN Imza (mobile ID) technology transfer project from Estonia to Azerbaijan tell us about the e-government technology transfer from developed to developing countries?"

- What elements were present in the process of technology transfer of ASAN Imza (mobile ID)?
- How did these elements interact with each other during the different stages of technology transfer?
- What technological, organizational, and environmental factors mediated the transfer process of ASAN Imza (mobile ID)?

– since e-government TT from developed to developing countries, to my knowledge, is a limited research area, choosing a case study is the most appropriate for this research. As such, the author wanted "to describe (…) unit in depth and detail, holistically, and in context" (Patton, 2015, p. 121).

The decision was made with regards to the case study to go with a single case. The rationale behind choosing a single case study over multiple case study was since it was extremely useful for a critical, unusual, common, revelatory, or longitudinal cases (Yin, 2018). Even though multiple case study is considered enthralling and stronger (Yin, 2018), the lack of time and resources was a challenging factor for the author. A single

case study has also been criticized for its inability to generalize; the main aim here though is to generalize it to the theoretical propositions which eliminates the former critique. Furthermore, a single case study is the most suitable because of the critical and common nature of a single case to the mobile ID TT from developed to developing countries confirming or generalizing exploratory findings (Patton, 2015). Since the mobile ID TT is still a fresh phenomenon and a relevant topic in today's environment, and TT from Estonia to Azerbaijan is one of the few cases of mobile ID, a single case study is best suited and most important research design in this thesis. For more extensive analysis of the case, the unit of analysis is divided to private organization and a government agency responsible for the whole ecosystem of the mobile ID in Azerbaijan. As such, embedded case study design is used as it includes data collected from different units or subunits (Yin, 2018).

An exploratory study is naturally favoured by a single case study (Gerring, 2004). Deductive research approach is utilized since the author began reviewing the particular social theory, which guided the data collection and analysis (Patton, 2015). An exploratory approach helped the author to find and study the important variables in the e-government technology transfer concept which is lacking in the current literature.

The selection of the case ('ASAN Imza') was for methodological and pragmatic reasons (Seawright & Gerring, 2008). As put by Seawright and Gerring (2008), the purposive case selection as opposed to complete random case selection is considered a rigid method because it facilitates researchers to choose the most appropriate case for the objective of the research. For the methodological justification of the case, the author conducted the first fieldwork before the creation of research objective and question and a screening of the potential cases for the case study (Yin, 2018). Yin (2018) proposes that it is important to have prior research if you are unsure about the topic and research question. So, initial literature review guided this research to TT from developed to developing countries. Then, initial meeting was conducted with one of the potential case studies (e/m Residency from Estonia to Azerbaijan); however, the insufficient data and sources which was because of the novelty of this case has led to change of the case study. This decision was based on the idea of Yin (2018) to choose the case that has most available data sources in it. As mentioned above, the case selection was also for pragmatic reasons such as author's interest in mobile ID topic, and access to multiple sources of data (Alasuutari et al., 2008; Yin, 2018). The author has also concluded that the topic of the mobile ID TT is worth to

examine since it will be more relevant with the increased use of mobile devices in the coming decades, and the selected case was perfect example of it. Likewise, the author had access to multiple sources of data including interviews, documents, and official websites for the ASAN Imza (mobile ID) case. There was not a language barrier between the author and the case study participants since the author's native language is Azerbaijani; as such, this factor helped the author not to rely on any translator or machine (Alasuutari et al., 2008).

The selection of the topic, research question, theoretical background and the further design of the thesis was formulated after conducting an initial fieldwork and a screening of the candidate cases (Yin, 2018). As mentioned above, initial fieldwork refers to the general review of the literature, while screening of the candidate case means to have initial conversation to check the availability of the data sources. Although the design of the research has always been understood as a linear and sequential process of defining the problem statement, establishing the theoretical framework and reviewing the literature, while in reality these processes are all interactive (Merriam & Tisdell, 2016). As such, the author has also used this interactive process to come up with the selected case.

A systematic literature was conducted before the formation of the research question and methodology by following the methods described by Webster and Watson (2002). The concepts for this thesis include 'Technology Transfer', 'IT technology transfer', 'International Technology Transfer', 'E-government', 'Mobile ID', and 'E-ID'. Firstly, a database search was conducted for the mentioned concepts in the Web of Science, Limo (KU Leuven), and Google Scholar databases. These databases provided invaluable insights to the previous literature since they contain extensive field of research topics and journals. With additional backward and forward search of the literature the complete literature review was conducted. The selection and elimination of the articles was based on the keyword, title, and abstract dimensions. To find a broad range of literature on the mentioned concepts numerous keywords were utilized which are: "technology transfer AND public sector organizations; "e-government technology transfer"; "technology transfer" AND developed countries AND developing countries AND e-ID* AND electronic identity*" and so on.

3.2 Data Collection

According to the classification of Yin (2018), there are a number of data collection methods including interviews, documentation, archival records, observations and so on. And in most of cases, authors use multiple sources of data collection methods, and as such, triangulation method complements and verifies the collected data (Alasuutari et al., 2008; Creswell & Creswell, 2018; Yin, 2018). Methodological triangulation helps to test the information gained via one method with the other collected data (Alasuutari et al., 2008). Thus, the author uses interviews and document analysis methods to validate the case study analysis.

3.2.1 Semi-structured Interviews

Interviews are the most approached data collection method in qualitative research (Creswell & Creswell, 2018; Merriam & Tisdell, 2016; Yin, 2018). Interviews are important part of the data collection method for this thesis. Interviews play an immense part when the history of past events are impossible to replicate (Merriam & Tisdell, 2016).

Likewise, case study interviews follow more conversational and open-ended questions rather than more rigid and structured questions (Yin, 2018). According to Merriam and Tisdell (2016), interviews can be divided into three types based on the structure given to it. Deciding on the amount of the structure of the interviews would lead to either highly structured/standardized, unstructured/open-ended interviews or semi-structured interviews which are in between of former types. Semi-structured interviews were chosen to conduct the interviews because it was the most appropriate type to answer the research question of this thesis. While highly structured/standardized interviews have prearranged questions and the sequence of it, and it does not allow interviewer to dive deep into the interviewee's world view, on the other hand, unstructured interviews follow no pre-determined questions rule and are mostly used when the researcher does not have enough knowledge about the topic. Unstructured interviews are then utilized to set questions for the next interviews. Semi-structured interviews refer to more open-ended questions and to the use of more and less structured questions or flexibly worded questions. This means the researcher has certain types of topics and questions beforehand to discuss, with no order and exact wording. Semi-structured interviews are also favoured in this thesis because it allows to gather similar kinds of information from all interviewees with the pre-determined topics and questions while, at the same time, it allows to react to the

situation and the answers of the interviewees (Merriam & Tisdell, 2016). Researchers also argue that we can combine all three interview types to get some standardized answers from all interviewees, some new ideas and concepts through unstructured questions, and some open-ended questions (Merriam & Tisdell, 2016). So, the author has utilized unstructured questions for the first conducted interview to get some detailed ideas and guide the research. Also, semi-structured questions were the main interview type for all the interviews, while the combination of semi-structured and unstructured questions led the final interview. The final interview included face-to-face interview with the two interviewees from Estonian side.

3.2.2 **Sampling**

As discussed by Patton (2015), the most important distinction between qualitative and quantitative research is the former focusing on the small sample sizes or even one case for the specific purposes. Purposeful sampling method is discussed by some researchers which means the use of the most appropriate sample for the best outcomes (Merriam & Tisdell, 2016; Patton, 2015). This method's strength lies in its selection of information-rich cases that would yield in-depth context (Patton, 2015).

As types of purposeful sampling, convenience and snowball or chain sampling were utilized in this research (Merriam & Tisdell, 2016). Convenience sampling refer to the selected sample which is based on time, money, location, or the availability and willingness of participants in the interview. On the other hand, snowball or chain sampling which is also the most used sampling method means getting help from the early selected participants regarding more suitable participants (Merriam & Tisdell, 2016).

Initially, the author selected the participants that met the criteria for this thesis and listed down those people's names and emails based on the information provided in the official websites of the respected organizations. The selected interviewees were the ones who engaged in the transfer process of mobile ID from Estonia to Azerbaijan and who implemented it in Azerbaijan. The ecosystem of the ASAN Imza (mobile ID) project will be discussed more elaborately in the coming sections; however, it is important to mention it briefly in order to inform the readers about the selected interviewees. The ASAN Imza (mobile ID) project initiated by the Estonian multi-national corporation B.est Solutions which has its private entity in Azerbaijan. B.est Solutions in Azerbaijan has full

Azerbaijani team, but it is operated and managed by Estonian stakeholders. This private company is considered as the IT or mobile ID service provider. As such, whole B.est solutions team in Azerbaijan and its two Estonian stakeholders included in the semi-structured interviews. Another unit of analysis were interviewees from National Certification Services Centre (NCSC) which was established by the State Tax Service of the Republic of Azerbaijan. NCSC together with the B.est Solutions team were responsible for the execution and implementation of the ASAN Imza (mobile ID) project in Azerbaijan. People from diverse background included in the interviews such as Project Managers, Business Development Representatives, Sales Officer, Executive Officer in order to grasp the idea from diverse perspectives.

Therefore, after conducting the first interview with the Executive Officer of the B.est Solutions, permission to her team members' contact details granted via the snowball sampling method. An email was sent to the respective people, and five out of nine contacted people responded positively. Five people from NCSC were contacted and out of three responded positively. So, eight interviews were conducted in total. All the interviewees were provided with the description of the research objective and research question to be able to compare the data from interviews. There were several interviews with one of the participants since she was part of the project from both Estonian and Azerbaijani sides. On another note, the author stopped collecting the new data based on the saturation idea mentioned by Creswell and Creswell (2018). The saturation idea refers that one can stop collecting new data from interviewees if the data gets duplicated and no new insights are provided (Creswell & Creswell, 2018). As mentioned before, after the first fieldwork meeting and unstructured interview with the interviewee the document created which included the e-government TT processes and the potential questions. This document was shared with the interviewees before the meeting.

The author has created and used a document with the potential topics and questions to ask throughout the interview. This document which is also called question protocol or interview guide helped to guide the conversation with interviewees (Creswell & Creswell, 2018; Merriam & Tisdell, 2016; Yin, 2018). While the author made use of this guideline to ask some main questions, she also made sure to intervene the interviewee and ask the right questions at the right time as a semi-structured interview type (Merriam & Tisdell, 2016; Yin, 2018). The question protocol was for the internal use to remember the main

concepts such as information and introduction of the research, some questions and some closing marks (Creswell & Creswell, 2018).

The interviews including the informal meeting with one of the participants took place from February 19th, 2021, to July 16th, 2021, which took approximately 60 minutes of meetings. The meetings happened via online interviews (Zoom and Teams applications) and face-to-face interviews with participants that were in Estonia. The interviews with the participants of B.est Solutions' Azerbaijani team and NCSC team members occurred in Azerbaijani, while it was in English with the Estonian participants. The author provides a list of interviewees in the Appendix (A). However, because of the anonymity rule, the author did not reveal the names of the interviewees.

3.2.3 **Documentation**

Documentation is one of the many methods of qualitative data collection (Creswell & Creswell, 2018; Yin, 2018). These authors believe that data collection methods other than interviews and observations are important because they might capture the information otherwise would be missed. Documents can be public documents such as minutes of meetings or hearings, studies or reports related to the case, articles from mass media or personal documents such as diaries, letters, and etc (Creswell & Creswell, 2018; Yin, 2018).

Publicly available information such as official reports of international organizations on the ASAN Imza (mobile ID) project or press releases, news and presentations were utilized to extensively understand the case and verify the information provided in the interviews. Official reports of international organizations and presentations about the ASAN Imza (mobile ID) project was provided by one of the interviewees. The author extensively benefited the documentation method of data collection since it can be reviewed anytime convenient to the author, and it can provide information that participants have given more attention. However, documents need to be revised with attention in order to exclude the bias from the author of the documents (Creswell & Creswell, 2018; Yin, 2018).

3.3 Data Analysis

To begin with, the author has found important concepts as a result of systematic and concept-centric literature. TT has elements including the donor and recipient organizations (transfer agent and transfer recipient), the transfer method (transfer media), and the transfer object. The demand environment (or the general environments of organizations) has excluded from author's elements because it has extensively described in the contextual differences of the organizations including the technological, organizational, and environmental factors. Three phases of TT including pre-technology transfer, technology transfer, and post-technology transfer have sub-divided into different stages of TT which is fundamentally based on the ETM of Cavalheiro and Joia (2014). How and why TT occurs from Estonia to Azerbaijan in the context of the ASAN Imza (mobile ID) is discussed through the stages of the TT processes. Then, how mobile ID as an e-government technology transfer project is important and valuable to the developing countries are elaborated. It was also concluded from the literature that the importance of two different IS systems should be highlighted in the transfer process in order to enable the successful implementation of the e-government project from one country to another country context. Thus, the points that should be paid attention are information, technology, processes, objectives and values, staffing and skills, management systems and structures, and other resources are under the technological, organizational, and environmental factors.

Thus, this paper and data analysis is based on the deductive research strategy. The theories found through the literature review guides the collection and analysis of the data (Patton, 2015). Data analysis is one of the most important steps in the qualitative research after the data collection from interviews, documents or observations where the author makes sense of the data (Creswell & Creswell, 2018; Merriam & Tisdell, 2016). Although the data collection and data analysis are explained in two distinct sub-chapters, these processes are highly dynamic and happening simultaneously (Merriam & Tisdell, 2016). Researchers also state that analysis of the data is close to an end with the data collection process, and it gets more intense when all the necessary data are collected.

All the interviews were recorded in the mobile device with the permission of all the interviewees which was transcribed afterwards. All the interviews were transcribed in its original language. The transcriptions were anonymized. As claimed by Merriam and

Tisdell (2016), verbatim transcription of the conducted interviews is considered the best method for analysing the data later. So, the author utilized an online tool to transcribe the interview in English, however the review of the transcription by listening to the audio records was provided. Likewise, the author transcribed the interviews manually that were conducted in Azerbaijani since no effective online tool found for the transcriptions of them. One of the popular qualitative data analysis software programs, MAXQDA was utilized for the coding and analysing the data. Codes and themes were assigned according to the theories provided in the literature review: elements, phases/stages of e-government TT and the technological, organizational, and environmental factors that mediated the transfer process of ASAN Imza (mobile ID) project.

4 Case Results

4.1 Case Description

4.1.1 Background of the ASAN Imza (Mobile ID) Project

In this thesis, the author takes technical and capacity assistance case between MNC that was established in Estonia and serves in Azerbaijan, its partner companies in Estonia, and the State Tax Service under the Ministry of Economy of the Republic of Azerbaijan. MNC (B.est Solutions) is an Estonian company that has its subsidiary in Azerbaijan and is a mobile ID service provider. It has Estonian team serving Estonian nation and fully Azerbaijani team providing services in Azerbaijan, while the founders of the company are 100% Estonians. The company delivers digital identity and e-government solutions to the rest of the world striving to prove the transferability of the Estonian success to other less developing nations. It has been awarded and recognized by numerous international organizations such as ITU (The International Telecommunication Union) in 2021, NIST (National Institute of Standards and Technology, U.S Department of Commerce) in 2019, UN in 2018 and so on (Krimpe, n.d.). The State Tax Service under the Ministry of Economy, in turn, is a state body belonging to Azerbaijani government ensures the service provision in a trusted way. In contrast to MNC, the Tax Authority's relation to the project is it is responsible to facilitate the implementation and use of the ASAN Imza (mobile ID); issue four types of certificates; and eliminate any problems arising from their use. These two stakeholders differ in their level of concentration on the provision of ASAN Imza (mobile ID) since MNC is fully concentrated on the implementation and managing of the e-government services to countries and the State Tax Service is the receiver of the project as part of fulfilling their services in an electronic environment.

As a matter of fact, ASAN Imza (mobile ID) project is based on the technical, administrative, or capacity assistance of Estonian company and its partners to Azerbaijani one together with the State Tax Service that resulted in Azerbaijani implementation of the ASAN Imza (mobile ID) project. The ASAN Imza (mobile ID) project which means "easy signature" in Azerbaijani was launched in 2013 as a pilot project, and it started its full operations in 2014. ASAN Imza (mobile ID) is a SIM based mobile identity which allows users to prove their identity equal to their physical ID-card and create signatures equal to the handwritten ones in the digital environment, and it is regulated by Azerbaijani

law and regulations. Highest level of security and assurance is provided according to the international requirements including GDPR and eIDAS with its PKI-based solution.

Participants in the transfer of the ASAN Imza (mobile ID) project from Estonia to Azerbaijan were the employees from Estonian MNC, its subsidiary in Azerbaijan and the National Certification Services Center working under the State Tax Service. However, it is worth to mention that Azerbaijani subsidiary of the Estonian corporation comprised the main dedicated team in Azerbaijan, and the trainings and lessons learnt from Estonian team was transferred from dedicated Azerbaijani team to the governmental body employees. One point should also be highlighted that Estonian organizations and government has close cooperation and good relationship with Azerbaijani government with regards to the digitalization of the public sector for a long time. Estonian government has assisted Azerbaijan to establish the X-Road project and as such the establishment of e-government. As mentioned earlier, Azerbaijani subsidiary of the Estonian corporation were full of Azerbaijani professional team who were responsible for the implementation of different e-government or digital identity projects both for public and private sectors. Team members included people with the background in mobile network/telecom operators, business analytics, various government departments or banking sectors. Professional team hired by the Estonian stakeholders of the corporation to take into account local (Azerbaijani) realities when implementing the project.

4.1.1.1 Azerbaijan

Azerbaijan was founded in 1918 and became the first Muslim-majority secular and democratic state (“Azerbaijan,” 2021). After its incorporation to Soviet Union in 1920, it regained its independence in 1991. Numerous digitalization initiatives have been taken by the government.

The ‘ASAN’ service centers were established in 2012 by the Azerbaijani government to provide governmental services to the citizens by using the most advanced technologies. The idea was and is to transform the service centers from ‘one-stop shop’ to ‘no-stop shop’ agencies by creating all the services in an electronic environment and giving online access to the citizens.

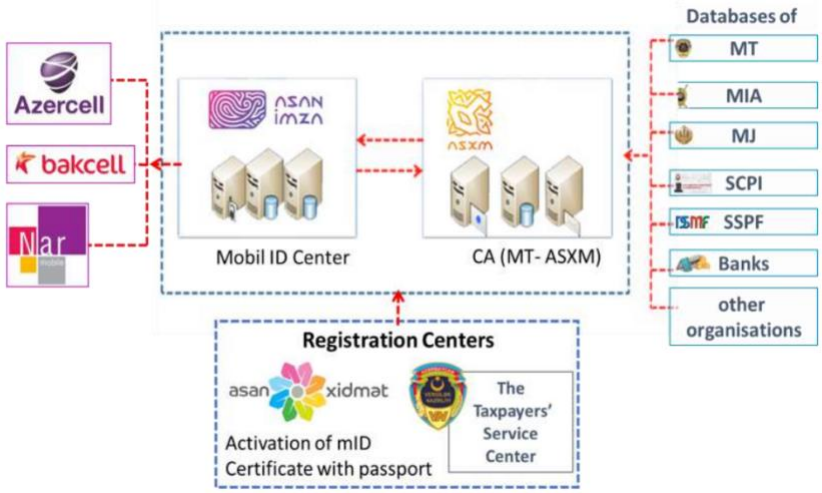
According to the UN e-Government Survey, Azerbaijan is ranked at 70th place out of 193 countries (United Nations, 2020). The first formation and development of "e-

government" and the broad application of IT in government agencies are carried out since 2003 in Azerbaijan. The foundation of the e-government program was laid by the “National Strategy for Information and Communication Technologies for the Development of the Azerbaijan Republic (2003-2012)” approved by the Order No. 1146 of the former president of the Republic of Azerbaijan, Heydar Aliyev dated February 17, 2003. As a result, “E-Azerbaijan” state program was launched in 2003. Legal framework for the data usage and its protection “Information, informatization and protection of information” law was introduced in 1998. Azerbaijani government has established number of decrees and acts regarding to the implementation of “Electronic Signature and Electronic Document” in 2004.

These legal frameworks and presidential decrees and acts have formed the foundation for the development of the mobile ID technology in Azerbaijan. First project issued by the Data Processing Centre of the Ministry of Communication and High Technologies was E-Imza (e-Signature) which was USB token-based and electronic smart card solution. Later, NCSC established by the decision of the State Tax Service under the Ministry of Economy of the Republic of Azerbaijan (former name: Ministry of Taxes of the Republic of Azerbaijan) in 2011. The NCSC is the transfer of turnkey certification authority project from MNC (B.est Solutions) which includes the technical support (including Registration Authority, OSCP service, time stamp, full documentation, ISO 27001, issuing four types of certificates, installation of soft- and hardware, Signing Soft, applications, etc.) (Krimpe, n.d.). NCSC is responsible government agency for providing electronic signature certificates for authentication and the SIM based ASAN Imza (mobile ID) and electronic smart cards (digital ID-card), as well as other certification services.

Azerbaijani government has understood the importance of digital identification for developing fully digital economy, and it considered the growth of mobile penetration, and as such it has invested in mobile ID project (Organisation for Economic Cooperation and Development (OECD), 2014). Likewise, identity is a fundamental human right to access not only e-government services but financial services as well. As such, the most secure and easiest identity solution is provided. This solution mainly includes those people from rural areas who do not have access to the internet and can easily use their mobile phones for e-services. The ASAN Imza (mobile ID) project is based on PPP solution. The stakeholders are mobile ID service provider (MNC), all three mobile network operators

of the country, governmental certification authority (NCSC), and the end-user service providers, as shown in the graph below.



Source: Krimpe (2014)

Figure 2. Interconnection Schema of the ASAN Imza (mobile ID) in Azerbaijan

Azerbaijan is the first country who started to use central approach in the implementation of ASAN Imza (mobile ID) project. Three MNOs (Azercell, Bakcell and Nar) shown in the left side of the figure 2 are linked to the whole ecosystem through the provision of the SIM cards. Users should obtain a special SIM card which later be put to their mobile phones.

The mobile ID service provider (as mobile ID Center in the center of the figure 2) is the private MNC who takes care of the whole ecosystem implementation starting from client support to the integration of the project to the new service providers. Governmental certification authority (NCSC) provides certificates for authentication and digital signing. For the security reasons, the users go to one of the registration centres (NCSC or ASAN service centers) physically to activate their SIM cards for three years period and to acquire their PKI certificates with their passports or identity cards for the first time. After that, users can access any e-government or private sector services online and verify their identity and sign electronic documents. The author focuses on the centre of this figure (cooperation between mobile ID service provider and governmental certification center) in this thesis since one is responsible for the implementation of the whole ecosystem and the other ensures the provision of the certificates and their use.

The ASAN Imza (mobile ID) project is integrated into more than 500 e-services including public and private sectors. Available e-services using ASAN Imza (mobile ID) includes the State Tax Service's tax services (e-invoice, e-deposit, state registration of commercial entities); Ministry of Labor and Social Protection of the Population's labour e-contracts; National Customs Authorities' declaration of imported goods and vehicles service (Krimpe, 2014). To conduct certain tax services and employment agreements users must have the ASAN Imza (mobile ID) certificates. More than 90% of the tax declarations are made using the ASAN Imza (mobile ID); and more than two million labour e-contracts are submitted in order to provide the transparency and eliminate the illegal employment (Organisation for Economic Cooperation and Development (OECD), 2014). More than 700 000 ASAN Imza (mobile ID) certificates have been issued, and more than 60 million transactions have been made since its establishment (e-Governance Academy, 2018).

The SIM based ASAN Imza (mobile ID) solution is taken as the most secure and easiest mobile ID technology, and it replaces smart cards and card readers. It meets EAL5 security level of international standards. Private keys are stored in users' SIM cards which are in their mobile phones. Every user has their Postal index number (PIN) codes and username which ensures protection of the ASAN Imza (mobile ID) certificates. They have two different PIN codes to sign in or access to the digital environment with PIN1 and sign the electronic documents with PIN2. Users have control over their PIN codes. Since to issue identities for citizens is governmental task, the identity management is done by government sector which ensures highest level of trust in the ASAN Imza (mobile ID) usage.

The ASAN Imza (mobile ID) certificates are provided to three different user groups including citizens, businesses, and civil servants. Every person's personal identity is embedded to their SIM cards managed by the population registry information.

4.1.1.2 Estonia

Estonia, in turn, is in the 3rd place in E-Government Survey ranking (United Nations, 2020). Azerbaijan is far from Estonia; the cultural background, religious belief, the population size and so on are the differing factors for both of these countries.

Estonia has already started to work on the e-ID solutions starting from 2000, and the first ID card is issued in 2002 (International Telecommunication Union (ITU) & Ministry of

Digital Affairs of the Republic of Poland, 2017). Estonian government has made the use of ID cards mandatory for everybody. There are three kinds of identity solutions such as Mobile ID, Digi-ID and ID cards, and they are utilized for authentication and digital signatures. Digi-ID is chip-based identity for digital use while ID card is only for physical use. The declaration of taxes in an online environment has started since 2001; the utilization of digital identities and signatures has been established since 2002; and the online voting has initiated in 2005.

The mobile ID, on the other hand, was established in 2007, and it is a SIM based PKI solution. Initially, every mobile network operator in the country issued different SIM based mobile ID solutions according to their rules of usage (time limit of the certificate, terms and conditions, and so on). However, Estonia has changed this in 2014 by creating centralized mobile ID service provider which connects all MNOs. 16% of mobile ID users are voting via their mobile phones (e-Estonia, n.d.).

Furthermore, the relations of Estonia and Azerbaijan has become closer over the few years with regards to the development of mutual economic and political ties (*Azerbaijan | Ministry of Foreign Affairs,* 2019). Azerbaijan's focus and interest on e-government experiences of Estonia is intensified. Estonian investors, in turn are attracted to Azerbaijani market in real estate and IT field. Therefore, foreign ministries of both countries signed an agreement for the cooperation in IT field which started its effect in 2009 (*Azerbaijan | Ministry of Foreign Affairs*, 2019).

5 Results

The results based on the coding and analysis of semi-structured interviews and documentations are shown in the following chapter. It is organized from the findings of coding categories which is based on the literature review. As such, the topics are depicted as following: the elements derived from the TT of the ASAN Imza (mobile ID) project; phases and respective stages of TT of the ASAN Imza (mobile ID) project; the factors such as technological, organizational, and environmental that mediated the transfer process between two countries.

The direct quotations of the interviewees are utilized from semi-structured interviews, and the provided information is triangulated through the use of multiple documents (international reports, presentations, articles, and so on). Since the author and some of the interviewees are Azerbaijanis, the interviews were conducted in Azerbaijani. It is translated into English for the results section. However, it was conducted in English with the Estonian stakeholders of the project.

5.1 Elements

As it is mentioned in the literature review, the TT can be influenced by the elements of TT process including the donor and recipient organizations, the transfer object or transfer mechanisms (Khabiri, Rast, et al., 2012). Some authors mistakenly believe the mere existence of technology object, or the donor and recipient of the technology would be enough to finalize the successful transfer process; however, all the other elements including mechanisms of transfer, the transfer object and so on are important factors for TT process (Bozeman, 2000; Khabiri, Rast, et al., 2012).

5.1.1 The Donor Organization

The donor organization in international technology transfer is an organization or country who is looking for transferring their technologies. In this case, Estonian MNC (B.est Solutions) and its partners in Estonia are the donor organization.

"*We are B.est solutions, Estonian company, but we have separate company in Azerbaijan. (…) and we are national mobile identity provider in Azerbaijan since 2013*" (Anonymous Interview 1, 2021).

"(…) it was totally private initiative. We decided to export Estonian e-solution outside. Because Estonia is very often criticized that all these e-government infrastructure is possible only because of Estonia's size, history, high literacy of the population. (…) So, our task when we founded our company [was] to prove that it's possible to do it outside. (…) It was just personal decision because I have roots in Azerbaijan (…) At the same time, it's completely different cultural and economic background, so it was very interesting to look how it will work in Azerbaijan" (Anonymous Interview 6, 2021).

Since B.est Solutions already had previous relations to Azerbaijani e-government development with X-Road, the ASAN Imza (mobile ID) project was initiated by their side.

"*We found that something is missing. We created the e-door [X-Road] but the e-key [electronic identity] is missing*" (Anonymous Interview 6, 2021).

5.1.2 **The Recipient Organization**

The receiver in this case is whole Azerbaijan, but the State Tax Service under the Ministry of Economy of the Republic of Azerbaijan is particularly responsible for the signing of the agreement with B.est Solutions.

"*The proposal and request were made by the State Tax Service, in order to eliminate the paperwork, the loss of time, the physical communication between the employee of the tax authority and the taxpayer, as well as to contribute to the development of e-government and the development of e-economy*" (Anonymous Interview 4, 2021).

Likewise, the NCSC under the State Tax Service was launched as a prerequisite for digital identity and e-signatures. The NCSC together with the Azerbaijani subsidiary of B.est Solutions are the receiver of the know-how to further develop and implement the project in Azerbaijani context. As such, these two entities (NCSC and B.est Solutions Azerbaijan) were responsible to receive the knowledge from Estonian team and afterwards apply it to Azerbaijani realities.

5.1.3 **The Transfer Mechanisms**

The mechanisms in the transfer process refer how technology was transferred from one country to another country. The whole project is based on FDI of B.est Solutions in Azerbaijan. B.est Solutions as an MNC has created its entity in Azerbaijani market through FDI. Then, Azerbaijani subsidiary of B.est Solutions collaborating with the NCSC had implemented the ASAN Imza (mobile ID) project in the context of Azerbaijani realities by sharing the knowledge and resources/facilities to serve its citizens.

The FDI in Azerbaijan was attractive to Estonian corporation for number of reasons outlined in the quotations:

"*Azerbaijan is very good market where we don't only have our clients but have a lot of feedback … and it's also very good proof of concept to go to another markets. (…) we work hard now to export our solution in another markets. Azerbaijani reference helps us a lot (…) Because they [other countries; markets] understand that you did this project somewhere else"* (Anonymous Interview 5, 2021)

"It's [Azerbaijan] really a huge benefit for us (…), even for Estonia. We [B.est Solutions Estonia], as the active member of the Estonian ICT Union, (…) share a lot of experience with local companies in Estonia and with foreign organizations as well. We get a lot of new lessons and new experiences from Azerbaijan which never happens in Estonia" (Anonymous Interview 6, 2021).

Through the documentation results it is also clear that certification authority (as part of the ASAN Imza (mobile ID) project) is a ready project of the B.est Solutions. Since certification authority is one of the most important parts of the ASAN Imza (mobile ID) functioning which issues different types of certificates, it was sold to Azerbaijani State Tax Service, and the technical assistance was provided since 2013. As part of the turnkey projects, continued trainings and support were required from B.est Solutions to the State Tax Service. Technological as well as administrative support provided to the NCSC regarding "*how to manage the infrastructure; how the certificates are issued; how to develop procedures; how to get certificate for security standards; how to follow the laws and legacy*" (Anonymous Interview 6, 2021).

5.1.4 **The Transfer Object**

Regarding the content and the form of what is transferred in ASAN Imza (mobile ID) case is mostly the know-how (tacit knowledge), technical services, or trainings to the Azerbaijani team of B.est Solutions and NCSC. As it is claimed by the interviewee 5 "*(…) it's [ASAN Imza] not like exactly copied from Estonian Mobile ID. It's based on the same principle [technological principle], but it was redesigned according to Azerbaijani realities. So, 20% is based on Estonian Mobile ID and 80% is developed by Azerbaijani team*".

All interviewees assert that there was a huge support from Estonian team and other partner companies in the beginning of the transfer process including support for the implementation of the ASAN Imza (mobile ID), the training of personnel, and so on.

"*(…) So, we have sent our [B.est Solutions Azerbaijan's] key specialists to trainings in our Estonian partner entities and companies (…) in order to get the knowledge on how to manage all the infrastructure*" (Anonymous Interview 1, 2021).

"*For [the State Tax Authority], we did the trainings in Azerbaijan. We had trainings on certification authority management, OCSP (certification policies), technological and administrative points on the creation of registration authority, etc.* (Anonymous Interview 6, 2021).

They also confirmed that the support and trainings on know-how of Estonian team happened only in the beginning of the transfer process, while later the Azerbaijani team was ready to implement the project on its own as affirmed in the following quote:

"(…) Of course, we took a lot of experience and know-how from Estonia. But for today we [adapted] a lot. Since Azerbaijan has its own national legacies, there are a lot of things which we adapted with local experts already in the beginning of the transfer process" (Anonymous Interview 2, 2021).

5.2 Phases and Stages

The phases in the transfer process of the ASAN Imza (mobile ID) project are divided into three which are further divided into stages. The following chapter will include each stage with the input of the interviewees in detail.

It starts with the pre-technology transfer process which includes the perception of the problem and choice of the technology.

5.2.1 Perception of the Problem

The initiation and implementation of the ASAN Imza (mobile ID) project was driven by the founder of B.est Solutions and the State Tax Service members, and it can be traced back to 2013 in which all the discussions started. The lack of centralized digital identity solution in the country was a driving factor for all the stakeholders to take an action. From B.est Solutions' side, the existing E-Imza (e-signature) card solution in the country was not promising enough for number of reasons; new digital identity tool was required in order to cover the larger audience.

"*People were not ready to use it [e-Imza card solution] because it was quite complicated. You need to have computer, card reader, particular software, and people's computer literacy for those times was very low. Thus, they couldn't use this very complicated infrastructure*" (Anonymous Interview 1, 2021).

The digital identity solution was required in the country for the easy access to governmental services. Since it is taken as the prerequisite for the functioning of the country's economy, B.est Solutions team decided to implement a kind of technology that will suit the local context of Azerbaijan as claimed by interviewees number 1, 5, and 6.

As it was mentioned earlier, the Estonian stakeholders from the B.est Solutions' team have already helped Azerbaijani government in the development of the e-government with the creation of X-Road. Afterwards, they have realized that identity management is required for the secure functioning of this system.

"*We decided that we need to empower e-services in the country. So, we found that the lacking part is identity management system*" (Anonymous Interview 1, 2021).

One of the interviewees have also emphasized the importance of the digital environment for both public and private sector services, and, as a matter of fact, the solution that creates one secure centralized ecosystem was required.

"*Digitalization of all the services and processes is now taking place in all over the world. (…) the security in the use of e-services and the protection of user data are the most concerned problems. (…) as the number of e-services increases and important services become digitalized (such as banking operations, opening a bank account, issuing a mortgage), the security issues are of public interest*" (Anonymous Interview 2, 2021).

From the State Tax Service's side, the e-ID solution was required in order to provide an easy access to e-services (i.e., tax services), to create transparency in the service provision and in the minds of taxpayers, to solve the corruption and bribery issues, and to increase the digital literacy rate in the country by creating tax services only accessible online to the taxpayers which was also claimed by the interviewee 4 (Secure Identity Alliance & onepoint, 2021). It was especially important to improve the voluntary tax payment of the taxpayers via the creation of online services and making it only accessible in an online environment.

"*One of the top priorities of the State Tax Authority was to create transparency in the tax services, as well as to reduce the physical communication between the tax authority and the taxpayers. (…) our main goal was to create a tax culture*" (Anonymous Interview 4, 2021).

5.2.2 **Choice of the Technology**

As reported by interviewees, a number of digital identity solutions existed in the world market including e-ID card solution, Smart ID, Mobile ID, and so on. The options for Azerbaijani government were either to create its own e-ID solution or to collaborate with the B.est Solutions and private sector MNOs to transfer mobile ID solution from Estonia and change it based on the Azerbaijani environment. Since it was more feasible to create a central ecosystem together with all the stakeholders (B.est Solutions mobile service provider, State Tax Service's NCSC, and MNOs), the latter option was chosen.

"(…) *Because of the PPP project, the technology was funded by our company [B.est Solutions mobile ID service provider], and Certification Authority creation was funded*

by government, because it still belongs to the government" (Anonymous Interview 1, 2021).

Likewise, implementing an advanced or fancy e-ID solutions was not feasible according to the digital literacy rate of the population and, at the same time, several members of the State Tax Service, who attended trainings in Estonia, were aware of the mobile ID solution and its implementation in Estonia.

"*Then we decided that now it's time not to go to e-ID conception but go to the next level – mobile identity; in other words, we need to 'skip' e-ID and go to the mobile identity*" (Anonymous Interview 5, 2021).

Although the option of creating its own e-ID solution for whole e-government services in Azerbaijan might be seen as a convenient option (meaning that without cooperation with private sector stakeholders), as seen from the previous experiences of the e-Imza (e-signature) case, the use of it was not widespread among the population.

So, given the State Tax Service's awareness that mobile ID was considered a potential solution to address the existing card solution's problems and as such the lack of centralized ecosystem for digital identity, a decision was made by the State Tax Service together with the B.est Solutions team to implement the ASAN Imza (mobile ID) solution and obtain know-how of the solution from the Estonian team and its partner companies.

Likewise, the choice of the technology was influenced by the penetration rates of the Azerbaijani population. Everybody, albeit the low literacy rate, can utilize mobile phones. People still lack the access to high-speed internet in the villages of Azerbaijan; however, they still need to conduct tax activities or to access basic e-government services. Thus, as reported by interviewee 1, by analysing Azerbaijani realities, the stakeholders decided not to copy-paste the Estonian mobile ID but create its own SIM-based ASAN Imza (mobile ID) solution which works much better for developing countries.

"*When you start to transfer technology, you don't have possibility to make mistakes. So, you need to deeply analyze the country and to understand which technology will be successful and used by all groups of the population before making the decision*" (Anonymous Interview 6, 2021).

"*I knew that E-Imza [e-signature card solution] will not have perspective in Azerbaijan. (…) the qualification [of people] is quite low in the context of technology. (…) So, I found the best idea is to create new identity to the market. Then we decided to implement Estonian case of mobile identity (SIM based solution) because we discovered that the penetration of mobile phones in Azerbaijan is very high, more than 100%. We also understood that people have very low digital literacy; the desktop solutions are very difficult for them to access and use. People do not use this tool [e-signature card solution] for e-services, so this was a main reason we initiated mobile ID technology*" (Anonymous Interview 1, 2021).

"We decided to build a centralised ecosystem and to make partner network with all players in the market" (Anonymous Interview 1, 2021).

Furthermore, certification authority was required as part of the digital identity solution which was missing from Azerbaijani government side. It would also be a challenge for government without sufficient knowledge of certification authority to create its e-ID solution without assistance from private sector.

Thus, the awareness of the mobile ID solution of Estonia from Azerbaijani government side, the active technical assistance of B.est Solutions to Azerbaijan's e-government, as well as the good diplomatic and trade relationship between Azerbaijani and Estonian government helped to establish a welcoming attitude towards the SIM-based mobile ID solution transfer.

Pre-technology transfer process phase is followed by the technology transfer process (the actual transfer) that comprise purchase/installation, capabilities of the recipient, adaptation, and adoption.

5.2.3 **Purchase/Installation**

There was not any hardware or software purchase from Estonia to Azerbaijan for the implementation of the ASAN Imza (mobile ID) project as indicated by the interviewee 5: "*It's based on the same technological principle, (…) but it was redesigned according to Azerbaijani realities*". The official certification authority was created under the State Tax Service for the secure functioning of the project with the help of the B.est Solutions. It was a turnkey project; technical as well as administrative support provided by the B.est

Solutions to the State Tax Service. Interviewees also mentioned that the cooperation and collaboration with Estonian team was more intense and frequently in the beginning of the transfer process, while the Azerbaijani stakeholders was technologically and organizationally ready to take the control for the rest of the transfer process.

"*We worked hand in hand with the Estonian team in the beginning of the transfer process, and they were very supportive in the training of personnel, in certain processes. We implemented this project with their support, but after a while, our workers and our team, gained a lot of experience*" (Anonymous Interview 2, 2021).

5.2.4 **The Capabilities of the Recipient**

Since the stakeholders for the implementation of the ASAN Imza (mobile ID) project in Azerbaijan comprised both Azerbaijani team of B.est Solutions and the NCSC of the State Tax Service, the most significant requirement for improving capabilities of Azerbaijani team considered the know-how of the mobile ID technology (including the creation of NCSC). As such, the whole Azerbaijani team of B.est Solutions was sent to Estonia to participate in trainings of different partner organizations. In addition, B.est Solutions Azerbaijan and Estonia have a common communication channel where they always exchange information with each other and ask technical questions if required. However, as stated by interviewees, this channel was more functional in the beginning because they no longer need support from the Estonian team. Besides these trainings, the State Tax Service employees had special administrative and technical assistance from the B.est Solutions team on how to create certification authority. The founder of the company reported:

"*We are very proud because we invested a lot in our human resources. We are sending them [Azerbaijani team of B.est Solutions] to international trainings and courses. It's very important that you have local people and know how. Because you can't make everything outsourced from Estonia. It is a critical infrastructure, and you should create this competency in the country*" (Anonymous Interview 1, 2021).

"*We work with Estonian team on certain projects and processes. If any problem arises (…), we deal with it together with them. But in general, there is an IT department here [in Azerbaijan], which can handle all the issues*" (Anonymous Interview 3, 2021).

5.2.5 **Adaptation**

Several adaptations were required during the implementation of the ASAN Imza (mobile ID) project in Azerbaijan from its Estonian counterpart.

First of all, the ASAN Imza (mobile ID) project is based on PPP which differs from Estonian case. Stakeholders are the government, all three national MNOs, B.est Solutions mobile ID service provider, governmental certification authority, and e-service providers.

The SIM-based ASAN Imza (mobile ID) is connected to 3 different certificates (citizen, businesses, civil servants) which is equal to a physical ID-card and handwritten signature in the electronic environment. The technical side and service is provided by a private mobile ID solution provider (B.est Solutions), while the State Tax Service guarantees the trusted and secure service provision (key storage, issuing and activation of certificates). The MNOs issue the SIM cards to citizens, and pricelist is decided by them, according to their regulation and business processes. Since there are different certificates for citizens, businesses, and civil servants, the prices are differing as well. Certificates are free for individual citizens while businesses pay a service fee of 9 euros for 3 years period. Each SIM card for citizens and business cost 1 euro in a monthly base. As such, the profit is divided between three MNOs and mobile ID service provider (Secure Identity Alliance & onepoint, 2021).

"*When Estonia implemented the project, it was mobile network operator-oriented. Technology belonged to MNOs. We found that is not a good way to start in Azerbaijan. Because three MNOs compete with each other in Azerbaijan. (…) So, we decided to build a centralised ecosystem; we [B.est Solutions] were the main operator. And we have partnership agreements with all mobile network operators in the market. So, this created one unique solution for all people. (…) Estonia reformed its system, after we did it in* Azerbaijan" (Anonymous Interview 1, 2021).

The adaptation was also required according to the national laws and regulations. As it was mentioned earlier, the Azerbaijani SIM based ASAN Imza (mobile ID) serves three different certificates while there is only one certificate or signature for every person in Estonia. The creation of certificates by activities (citizen, business, or civil servants) was for the reason that the interoperability is extremely low between public and private sectors

which creates difficulties for service providers to identify their clients in the digital environment.

"*It is different in Azerbaijan compared to Estonia. (…) Because in these countries the interoperability is not so high like in Estonia, and very often you can't get [enough] information from different registries*".

"Some limitations exist by the law as well. For example, there are still business secret law. So that's why we created such kind of certificates by activity. And it's directly integrated with registry. So, if you would like to get business certificate, the Business Registry gives a certificate according to your role in the company. It's very [beneficial] for service providers because they shouldn't check the role of the person when they provide service for business. Also, mobile ID solution gives the possibility to install different several certificates in one SIM card. So, by default, you have certificate and citizen. If you have three companies, you have all three certificates as well. You have one tool and a lot of different roles". (Anonymous Interview 1, 2021).

After the implementation of the project and the feedback obtained from users it was realized that the users do not understand the importance and the power of the ASAN Imza certificates. Therefore, adaptation was made regarding the use of PIN codes because people were giving away their PIN codes for the signing of the legally important documents.

"*We have 2 PIN codes. PIN one is for certification and PIN two is for signing. These transactions are technologically the same. But (…) we tried to give people this soft studying so they should understand the differences between entering to the system and doing transaction which is legally important. Through the system we try to create additional instruments for people to understand how the digital world look like and what's the difference of transactions?"* (Anonymous Interview 1, 2021).

Additionally, the username besides user's phone number is asked when signing into the digital environment for the security reasons.

"*Generally, only the number is entered when using Mobile ID. In Azerbaijan, an additional ASAN Imza user ID is required (6-digit code). An additional secure code has been added so that I do not spam your number*" (Anonymous Interview 3, 2021).

The necessity for another adaptation was identified during the implementation of the ASAN Imza (mobile ID) project. The Call Centres were initially operated by the State Tax Service; however, it was transferred to the responsibility of mobile ID service provider.

"*We wanted to get direct feedback from customers, and we know much more than the State Tax Authority. People are asking a lot of technological questions. Now we serve them directly. And it's much better because we know exactly what the problems are*" (Anonymous Interview 1, 2021).

The quick change was incorporated when the COVID-19 outbreak took place. The users did no longer need to go to the Registration Centres physically to prolong their certificates. they were provided with the possibility to do it completely online.

5.2.6 **Adoption**

Adoption is perceived as the most important indicator for the success of the e-government projects; therefore, there was huge political will and government level enforcement for the adoption and use of the ASAN Imza (mobile ID) among businesses as it was also mentioned by the interviewees.

"(…) *You need to push people to start to use all kinds of new technologies. So, in that case, the pushing part was the State Tax Authority, which created some obligatory services for businesses. The best part starting with businesses is because they quickly value the impact and benefits of this service. Also, businesses have resources to invest, to teach how to use it*" (Anonymous Interview 1, 2021).

Apart from tax services, other governmental and non-governmental services have also integrated the ASAN Imza (mobile ID) into their systems to securely identify and authenticate their users. Even though it took time for financial service providers and other service providers to understand the necessity of the ASAN Imza (mobile ID) in the provision of their services, the statistics show more than 1000 e-services is available and more than 90 million transactions issued via ASAN Imza in 2020. Customs services, labour and social protection services, e-government portal, different financial institutions such as banks and insurance companies' services are based on the ASAN Imza (mobile ID) project.

"*In the beginning, of course, it was very difficult. It was a lot of explanations, a lot of free of charge job. We [mobile ID service provider] tried to create more and more services; we explained every single service provider why they need it. Today, we're not doing this job [PR] anymore. So, digital literacy is becoming higher; service providers understand that they are responsible as secure identity and authentication provider as cybersecurity issues become very active*" (Anonymous Interview 2, 2021).

As reported by all the interviewees, the State Tax Service is one of the first governmental body which promoted digitalization in the service provision and used e-Tax system since 2006. Since it is a huge governmental authority with the big workload, the digitalization helps it to save its time and money. Therefore, they have integrated the ASAN Imza (mobile ID) into their e-Tax portal and mandated the use of it throughout the country: "*The electronic confirmation of invoices, VAT payments, and some report forms are only conducted in online environment with ASAN Imza*" (Anonymous Interview 4, 2021). As mentioned before, labour and social protection services such as labour contract registration of employees should be filled in the Ministry's (Labour and Social Protection of Population) electronic system with the ASAN Imza by all the business user groups.

"*There are some transactions for business user groups that cannot be carried out without ASAN Imza. For example, the registration of workers' employment contracts is a very important and controlled process. And during the control measures, if the employment contract is not registered in the electronic system, the employment contract is not considered valid, which leads to the financial sanctions. At the same time, it leads to liability for administrative offenses*" (Anonymous Interview 4, 2021).

Likewise, starting from 2015, financial service providers such as banks and insurance companies, have also actively integrated the ASAN Imza into their systems.

Furthermore, government and private sector entities including banks and MNOs has a close collaboration and partnership in order to enhance the uptake and promote the Asan Imza (mobile ID) to individual citizens and businesses. Activities include advertisement campaigns or on the spot consultations (Secure Identity Alliance & onepoint, 2021).

"*Because all services for businesses are absolutely online now and they actively use it everywhere. But now we are seeking how to onboard citizens. And that's why we are planning to implement some radical changes, such as making the service free for citizens,*

creating some new instruments or services, making more cooperation with financial sector" (Anonymous Interview 1, 2021).

Post-technology transfer process phase, in turn refer to the diffusion/innovation and feedback to donor.

5.2.7 **Diffusion/Innovation**

After the implementation and integration of the ASAN Imza (mobile ID) project, several problems occurred and immediately solved by the B.est Solutions Azerbaijani team. The adaptation sub-chapter has already included the adaptations made during the implementation process, and therefore, certain incremental innovations created.

Since the number of cases, where the users were giving away their certificates to their employees, were increasing, the incremental innovation was made by creating Self-Service Cabinet for users. The possibility to close the access to some services for the employees of the holder of business certificate created.

"*We [mobile ID service provider] created self-service portal for ASAN Imza users where they can see the history of transactions. So, owners could at least see what is done with ASAN Imza, and if it was used for good reasons by their employees*" (Anonymous Interview 6, 2021).

Additionally, since some of the tax services are only available in digital environment, and people are mandated to use them, people with low digital literacy and no access to internet were facing difficulties using the ASAN Imza. The Tax Call Centre created and integrated to the rural areas to help elderly or people with low literacy to fill their tax declarations. It is also claimed by the interviewee 1 "*What we never discovered in Estonia was to integrate the Call Centre with rural areas. Because there are no so-called rural areas where people don't have access in Estonia*".

"*(…) we integrated ASAN Imza with Tax Call Centre for those people who don't have access to internet or web browsers (those who can't fill the tax declaration because they don't have instrument for that). So, now they can call the Tax Call Centre, and the civil servant from the Call Centre would guide the taxpayer. They should answer the questions of call centre servants such as "how much tomatoes were sold and what was the price?" and enter their PIN 2 to submit it"* (Anonymous Interview 1, 2021).

5.2.8 **Feedback to Donor**

As reported by the head of project operations of the ASAN Imza (mobile ID) in Azerbaijan and the founder of the ASAN Imza (mobile ID), the implementation of the project in Azerbaijan was autonomous to the Azerbaijani team after the transfer process happened. Interviewees 1, 2, 3, 5, and 6 claimed that Azerbaijani team had all the required technical, organizational, and managerial capabilities. Likewise, the interviewee 1 reported that the SIM based mobile ID experience of Azerbaijan can be shared and used by other developing countries.

"*(…) Our [ASAN Imza] solution is much more attractive for African countries because they understand Azerbaijani problems much more than Estonian one. For them, Estonian lifestyle is not compatible, and they don't believe that they can do it. So, it's a very important case study which Azerbaijan can re-export the solution to other countries*" (Anonymous Interview 1, 2021).

So, the Azerbaijani team of the mobile ID service provider together with the NCSC under the State Tax Service are independent from Estonian team, and capable of solving any ASAN Imza (mobile ID) related problems in-house. However, as mentioned by the interviewee 1, 5 and 6, Estonian stakeholders have provided the lessons learnt in Azerbaijan to Estonian ICT Union where the experiences are shared among the organizations. Likewise, Azerbaijani team has a common channel with Estonian team where they have daily communication with each other for the regular feedback in a more informal manner.

5.3 Technological, Organizational and Environmental Factors

The author decided to talk about the technological, organizational, and environmental factors that mediated the transfer process in the ASAN Imza (mobile ID) project which includes both the donor and recipient organizations' environments with the main focus on recipient country. It is based on the proximity of the countries with regards to their technological infrastructure, human labour, skills, working culture and organizational structure of the recipient, the mind of people, and governmental rules of the recipient. As such, how these factors differ from each other in Azerbaijan and Estonia, and how they mediate the implementation of the ASAN Imza (mobile ID) will be discussed in the following chapter. Thus, this section both includes the donor and recipient organizations' environments from the elements sub-chapter and the contextual distances of the countries from the stages sub-chapter.

Technological Factors

The SIM based ASAN Imza (mobile ID) is considered the easiest and most secure tool in the market which is also identical with the Estonian Mobiil ID (with some adaptations to the functionalities as discussed in the previous chapter). However, the main difference on the management and operations of the technology was that Estonian Mobiil ID was MNO-oriented when it was discovered in 2007, and each MNOs had their own technology. The ASAN Imza (mobile ID), though, was the first in the world to implement centralized ecosystem through PPP model for the implementation of the project. Interviewee 6 reported that through the lessons learnt Estonia has changed its ecosystem as well: "(…) *after we have implemented this in Azerbaijan, Estonia reformed the system as well. This is a good example of the win-win case for both countries*".

Implementing it is simple for all parties including end-users and end-user service providers. For the end users, the ASAN Imza (mobile ID) enables them to utilize their mobile phones (not necessarily smart phones) as an authentication and signing tool in a secure manner. It does not require any smart card, card reader, personal computer, or software. It is supported by all the operating systems. The high flexibility of the technology, meaning the ability of individuals to obtain different certificates (for citizens, businesses, and civil servants), makes it accessible to anybody. As reported by all interviewees, the conveniency of the technology was one of the important factors for its

success in the country. The ASAN Imza (mobile ID) is convenient for all types of networks including 2G which makes it the best choice for developing countries.

"*There's no point to give people a new or fancy technologies that would be difficult to use. (…) there are a lot of areas in the world where there is still no Internet. They still use 2G. (…) mobile ID on a SIM based solution gives the possibility to use e-services in even 2G network*" (Anonymous Interview 6, 2021).

Likewise, the end-user service providers do not need additional technology or anything else to integrate the ASAN Imza (mobile ID) to their systems, as mentioned by interviewee 6: "(…) *to integrate the technology to the government or financial institutions' services takes maximum one or two days*".

Furthermore, the technology follows the highest international security standards (EAL5), and international regulations such as GDPR and eIDAS. SIM cards which are provided by the MNOs are based on PKI solution (with public and private keys). The privacy of the citizens is secured by private keys and incorporated to the SIM cards. The keys, in turn, are protected by PIN codes.

Organizational Factors

However, as it was also reported by the interviewee 6 "*the technology is only 10% of the success*". Different organizational and environmental factors including the working conditions and capabilities of the organization, government support, country's legacy, users' mindset, and all the other related stuff are important dimensions.

The necessary capacity and capabilities were important in the organization to implement the technology in an effective and efficient manner. Since the mobile ID service provider (B.est Solutions) is the Estonian MNC with its subsidiary in Azerbaijan, they were responsible for the implementation and execution of the ASAN Imza (mobile ID). However, different MNOs created their own technology with their own rules and regulations for the use of mobile ID. So, they have a different workflow regarding the provision of digital solutions.

The nature of the Estonian and Azerbaijani institutions could be considered as the biggest difference. The ASAN Imza (mobile ID) project was based on PPP including the government, mobile ID service provider, MNOs, and end-user service providers in Azerbaijan, and while the implementation and provision of whole ecosystem is managed

and funded by the private company (mobile ID service provider), the certification authority is provided and funded by government. However, as mentioned earlier mobile ID was created by different MNOs in Estonia. Estonian mobile. As such, MNOs usually provide services to the private customers.

Additionally, the procedures for the hiring new employees might be regarded similar since the existing team in Azerbaijan was hired by the special care of the founder of the company (B.est Solutions). As such, it was important to take the local context of the country by hiring local people.

"*We are very proud because we invested a lot in our human resources. We are sending them to international trainings and courses every year. So, it's very important that you have local people and know how because you can't outsource everything from Estonia. It is critical infrastructure, and you should create this competency in the country*" (Anonymous Interview 1, 2021).

Environmental Factors

The first challenge occurred because of the lack of interoperability among different sectors and of the business secret laws in Azerbaijan. Therefore, the ASAN Imza (mobile ID) project had to be adapted to the situation by creating different user groups of citizens, businesses, and civil servants that differs from Estonian counterpart.

"*There is still business secret law in Azerbaijan where you can't get access to the necessary information such as people's positions. This creates difficulties for the end-user service providers whether to accept the users to their systems. That's why we created such kind of certificates by activity [user groups] which are directly integrated with registry. So, if you would like to get business certificate, the Business Registry gives a certificate according to your position in the company, whether you are the owner, director, or accountant. It's very easy for service providers because they shouldn't check the role of the person when they provide service. So, it's checked by certificate itself. (…) If you have three companies, you have three different certificates as well*" (Anonymous Interview 1, 2021).

"*Same with the civil servants. If he is the minister, he can get the certificate as a minister and sign as a minister. But if tomorrow he is not, his certificate will be cancelled. So, he can only use it as a citizen*" (Anonymous Interview 1, 2021).

On the other side, Azerbaijan had all the fundamental laws and regulations in place for the digitalization of services, data protection, and use of electronic identity and signature. The president of the Republic has signed the decrees and acts regarding digitalization of government since 2004. The government support and high political will were significant indicators, mentioned by all the interviewees, for the implementation and adoption of the ASAN Imza (mobile ID).

"*From regulation side, everything was in place back in 2013. The only missing part was technology itself. Likewise, the political will was also very high*" (Anonymous Interview 7, 2021).

"*The political will was very high, and especially the State Tax Service was always the most innovative governmental body. This authority is usually a driving force for a lot of innovations. It was the first entity who decided to conduct the tax declaration for VIT taxpayers in an electronic environment in 2013. So, it was also very important for our project to have the forcing decision from government side. This helped the wider use of ASAN Imza*" (Anonymous Interview 6, 2021).

As such, government, by making those important services only available in the digital environment created a forcing mechanism to use the ASAN Imza (mobile ID). This was also followed in Estonia as it is discussed by interviewee 5 and 1 respectively:

"It also started with tax declaration which was obligatory for all population of Estonia to fill it electronically. If government invests taxpayers' money to develop key government infrastructure, and if they do not force people to use it, it would be waste of money. In some cases, government should force people to discover the benefits of technology (…) Because people are different, (…) and sometimes you need to create some forcing mechanism. So, after that people would find it helpful to save time, and to fight the corruption and bureaucracy" (Anonymous Interview 5, 2021).

"We took Estonian example. So, if it is built on the free choice of people, nothing would happen. Because we are all humans, and we don't like to waste additional efforts to do some things. People like the easiest way, and you need to push people to use all kinds of new technologies. So, in that case, the pushing part was the State Tax Authority, which created obligatory services for businesses" (Anonymous Interview 1, 2021).

From cultural perspective, the adoption or integration of the ASAN Imza (mobile ID) by end-user service providers and use of it by citizens was confronted with skepticism in the beginning of the project. This was for the low digital literacy rate of the population. However, both end-user service providers and citizens have come to understand the importance of the electronic identity in the service provision and the protection and security of the user information with the digitalization of services in the public and private sectors.

"Of course, the first reaction was quite negative from users; people were thinking somebody sees all the transactions they are making. It took time to explain people about the security of ASAN Imza" (Anonymous Interview 8, 2021).

"However, after few months of the project initiation we have gathered Big 4 companies in the conference, and they said that it's one of the most significant changes in the mentality of people. Because people started to feel the benefit of it since they do not need to physically go to the civil servants for the service acquisition. So, this was a revolutionary service for Azerbaijan. And then step by step we started to integrate more and more services" (Anonymous Interview 6, 2021).

This was also supported by the interviewee 2:

"The end-user service providers (especially financial sector) have not paid much attention to the security of the provision of e-services or the protection of personal information in the very beginning of ASAN Imza integration. They mainly focused on the digitalization of the services; however, as e-services became more and more popular in the country, all service providers became more interested in this issue. Especially after the war [Nagorno-Karabakh war between Azerbaijan and Armenia in 2020] in which the country was incurred to different cyber-attacks. After that, all users and service providers began to think about security of services".

As reported by the interviewee 6, the adoption and diffusion of the ASAN Imza (mobile ID) solution was also affected by the 'word of mouth' culture of Azerbaijani nation.

"(...) you shouldn't invest so much money in PR because the spread of mouth is much effective than any PR in Azerbaijan. People do not communicate so much, and they learn everything themselves in Estonia, but people learn through communication with others in Azerbaijan. So, people quickly share the positive experience with others. Of course, it

could be not only benefit if you do something wrongly. So, you should be very careful" (Anonymous Interview 6, 2021).

Last but not least, one of the environmental mediators in the transfer process of the ASAN Imza (mobile ID) project was regarded as the investor-friendly environment of Azerbaijan.

"Azerbaijan is open to learn new innovations from other countries and to create something new. (…) Azerbaijan is investor-friendly country. So, we as a foreign company [B.est Solutions] succeeded; we are operating critical infrastructure in the country which means that Azernaijan is open to foreign investors. I think this is the best case to prove, not even rankings like doing business, that foreign people can work in Azerbaijan successfully" (Anonymous Interview 1, 2021).

6 Discussion

6.1 Summary of the Main Findings

To begin with, as the literature suggests, the e-government technology in the developing world is mainly based on the research and knowledge of the more advanced countries, the studied case supports this by transferring the knowledge and experiences of the Estonian government (Lind, 2020; Sæbø, 2012). Likewise, the lack of necessary infrastructure, technical knowledge and cultural barriers of Azerbaijani government has forced it to lag behind. This idea is pinpointed by Chen et al. (2006). Furthermore, since the transfer process of technology is not a straightforward process of technology moving from one country to another, adaptation, adoption and improvisation of the technology to the local environment is required as stated by Reddy and Zhao (1990). In the ASAN Imza (mobile ID) case, the adaptation of the project to the Azerbaijani realities by changing the functionalities of the technology and by including the dedicated Azerbaijani team was one of the priorities.

The data analysis results of the transfer processes of the ASAN Imza (mobile ID) from Estonia to Azerbaijani context briefly reveal the elements of the transfer process which are described as the donor and recipient organizations, the transfer object, and the transfer mechanism. The Estonian MNC (B.est Solutions as the mobile ID service provider) as the donor organization has initiated FDI by creating its subsidiary in Azerbaijan which is a recipient organization. Since Estonian and Azerbaijani governments had close relationship in terms of the e-government development of Azerbaijan, it was considered as the suitable market for the B.est Solutions. The transfer of know-how and trainings as the transfer object occurred to implement the Estonian version of the mobile ID in an Azerbaijani context. Likewise, the B.est Solutions' Azerbaijani team together with the State Tax Service of the Azerbaijani government has collaborated to implement the project into Azerbaijani realities which has also been supported by the Estonian team and partners of the B.est Solutions. As claimed by Gupta and Govindarajan (2000), the TT is not only about the selling or buying the technology which is clear in this case by the inclusion of the donor and recipient organizations, the importance of the transfer object and the mechanisms of it. The active participation of the Azerbaijani team in the design and implementation of the project had the positive impacts on the outcome of the project (Dudley, 2006; Ramanathan, 2001; Wei Choo & Johnston, 2004).

Furthermore, three phases of the e-government TT are further developed into the stages of the ASAN Imza (mobile ID) processes. This, as such, is shown in the table 1. The table describes each activity of the stages as identified from the semi-structured interviews. Even though the table 1 clearly explains all the main points identified during the ASAN Imza (mobile ID) implementation, it is worth to emphasize the main stages that are also highlighted by the interviewees. The main stages that had relatively more impact on the outcome of the ASAN Imza (mobile ID) project were the capabilities of the recipient and the adaptation stages. First of all, hiring of the personnel to the B.est Solutions Azerbaijan was conducted with the special care who had previous work experience in the mobile telecom operators, or project management, and continuous investment was made by sending the team to the international conferences and trainings. At the same time, the NCSC was created by the State Tax Service with the technical and administrative support of B.est Solutions. Secondly, adaptation activities were of paramount importance for the functioning of the ASAN Imza (mobile ID) project in Azerbaijan. This was required because of the low literacy rate of the population, and other realities of Azerbaijani context. Thus, this confirms the existing literature on the incremental improvisations and the active participation of the recipient organization in the e-government TT process (Cavalheiro & Joia, 2016; Stanforth, 2006). Likewise, as stated by Heeks (2002a), the 'design-actuality' gap of the donor and recipient countries should be minimized which, in this case, has done through the capabilities of the recipient and the adaptation of the technology to the local environment.

The ASAN Imza (mobile ID) case study has also shown that transferring the mobile ID project (through knowledge, expertise, and capabilities) from Estonian to Azerbaijani context have embraced the nuanced resource coordination and collaboration throughout the project lifetime to decrease the contextual distances and close the gap between developed country's designed solution and developing country's realities (Cavalheiro & Joia, 2016; Ciborra, 2005; Heeks, 2005; Reddy & Zhao, 1990; Stanforth, 2006). As such, the analysis of the ASAN Imza (mobile ID) project through the use of e-government TT phase and stages, and of the technological, organizational, and environmental factors included in the stages of TT processes have facilitated to contribute to the issues and mediators related to the e-government TT. The proximity of the donor and recipient organizations have analysed through the use of technological, organizational, and environmental factors.

The mobile ID project is also best suited to Azerbaijan because of its conveniency and its secure solution. The e-ID solutions in the market including smartcards, e-ID cards, and USB tokens have criticized with its complex utilization which requires either additional card readers, special software, or computer device. Furthermore, the privacy and security concerns have also risen over the years with regards to their usage (Eaton et al., 2018; Hölzl et al., 2018; Melin et al., 2016; Wu et al., 2015). As shown from the case study, the mobile ID solution is provided as to solve the problems mentioned here. With the 99% of global mobile cellular penetration rate, the mobile ID solution is considered as the best solution in order not to create a complex digital identity infrastructure which might be the biggest problem of developing countries.

The literature shows that TT projects partially or fully fail in the implementation phase of it because of the unsuitability of the technology to the recipient organizations; developing countries are not ready to implement sophisticated and advanced technologies to its environment or technologies are not designed based on the recipient country' local realities (Heeks, 2005; Jegathesan et al., 1997; Khabiri, Rasta, et al., 2012). The ASAN Imza (mobile ID) case has shown the successful adoption and integration of the project country wide since it has designed and developed according to the Azerbaijani realities and with the active and full participation of Azerbaijani team.

Furthermore, the technological, organizational, and environmental factors such as the improvisation of the functioning of the technology by creating a centralized ecosystem, the training of the personnel, the existence of the fundamental laws and regulations, and the change of the people's mindset through soft studying or advertisements in Azerbaijan, has closed the 'design-actuality' gap with Estonia, and created a favourable conditions for the implementation and adoption of the ASAN Imza (mobile ID) in the country (Cavalheiro & Joia, 2016; Ciborra, 2005; Heeks, 2002a, 2002b; Stanforth, 2006).

Pre-Technology Transfer Phase	
Perception of the Problem	• The lack of centralized digital identity system; • Insufficient capability of the people to use existing e-Imza card solution; • Significant requirements with regards to the secure and convenient service provision in the digital environment; • Increased pressure to create transparency, to solve corruption and bribery, and to improve the digital literacy rate of the population.
Choice of the Technology	• The low digital literacy and high mobile penetration rate of the population; • The awareness of Azerbaijani government about mobile ID solution of Estonia; • The lack of knowledge and infrastructure of the government to build its own solution without the collaboration with private sectors.
Technology Transfer Phase	
Purchase/Installation	• The creation of NCSC by the turnkey project of B.est Solutions to Azerbaijani government; • The establishment of hardware and software by Azerbaijani team with collaboration of mobile ID service provider, government, and MNOs.
Capabilities of the Recipient	• The transfer of know-how and the support for the training of personnel from Estonian team and partners to Azerbaijani team in Estonia; • The technical and administrative support to create NCSC for the State Tax Service from B.est Solutions; • Communication channel between B.est Solution teams to get support.
Adaptation	• The creation of unique centralized ecosystem according to the PPP solution; • The creation of certificates based on the user groups (citizens, businesses, and civil servants) because of the lack of interoperability among public and private sectors, and business secret law in the country;

	• Insufficient knowledge of the importance of ASAN Imza (mobile ID) certificates by the population, as such the requirements to create soft teaching mechanisms by PIN codes; • The necessity to create additional username (besides mobile phone number) to avoid spamming; • The change of responsibilities among stakeholders (mobile ID service provider and NCSC) regarding the operations of Call Centers.
Adoption	• Government enforcement of ASAN Imza (mobile ID) usage in the State Tax Services; • Collaboration and partnership of the stakeholders by advertisement campaigns and spot consultations to increase the uptake and to promote ASAN Imza (mobile ID).
Diffusion/Innovation	• The establishment of Self-Service Cabinet for the users of ASAN Imza (mobile ID) to access the history of transactions; • The integration of the Tax Call Centre to the rural areas to help elderly and people with low literacy.
Post-Technology Transfer Phase	
Feedback to Donor	• Autonomous Azerbaijani team with no formal feedback to Estonia; • The provision of lessons learnt in Azerbaijan to Estonian organizations by the Estonian stakeholders

Source: Author's Compilation

Table 1. Summary of the Main Results. Phases and Stages of ASAN Imza (mobile ID) technology transfer processes

6.2 Theoretical and Practical Implications

This thesis has contributed to the extant literature of e-government TT and mobile ID TT from developed to developing countries. Firstly, it adds to the literature on e-government TT with the focus on the elements, the phases, and the stages of e-government TT processes. The existing literature lacks this knowledge in international e-government TT that elaborates all the points with the case study research. While there is extensive literature under the name of transfer of IT, however it does not include all three points (elements, phases, and stages) of e-government TT. Likewise, the literature on the transfer of IT does not include the contextual differences among the donor and recipient organizations which is discussed in this paper as the technological, organizational, and environmental factors. Thus, this thesis creates more complete picture of e-government TT. On the other side, there is a recent paper of Cavalheior and Joia (2016) where the e-government TT process is discussed in the context of European Patent management system in Brazil. This thesis contributes to this work with the focus on the mobile ID TT which is novel and understudied topic in the literature.

The study also shows that existing literature mainly focuses on the e-government strategies developed by the developed countries, lacking the perspective of developing countries. As such, it would yield valuable insight for practice to look at the e-government technology transfer from developing countries' perspective.

As already mentioned in the literature review chapter, numerous developing countries including Azerbaijan, Turkey, Moldova, Oman and etc. are investing on the development and establishment of the mobile ID solutions to provide a secure access to the online services for their citizens. Since there has been a number of attempts for building the mobile ID solutions from more advanced countries such as Estonia, Belgium, Finland and Austria, and the values of it are progressively growing for the developing countries with the uptake of mobile phone usage; there is a need for the e-government TT literature with the focus of mobile ID TT processes. To this end, this thesis aims to contribute to the missing literature by extensively describing the ASAN Imza (mobile ID) project implementation in Azerbaijan. For this reason, this thesis has practical implications to the e-government TT literature in the context of mobile ID solution.

This research can be a foundation for the future works; researchers can utilize the findings of this thesis and go deeper to the e-government TT processes of different countries. This

thesis can help other researchers by utilizing the findings in the multiple-case study of e-government TT in the developing countries. Likewise, an in-depth and extensive description of Azerbaijani ASAN Imza is provided which can help future civil servants or policymakers of developing countries when establishing their mobile ID projects. Policymakers, researchers, and different international and multi-level practitioners of e-government TT can learn from this thesis as well.

6.3 Limitations and Further Research

The author identifies the limitations of this thesis and proposes that these limitations can be viewed as opportunities for further research. The ASAN Imza (mobile ID) case depicts an in-depth analysis of a single case including Azerbaijani and Estonian stakeholders to study the research area that is novel and fresh in the literature. As such, an exploratory single case study of this thesis is unique in its size and timeframe which might lead to the lack of generalization of the results (Yin, 2018). Although detailed (rich qualitative) information is gained from the ASAN Imza (mobile ID) case study analysis, the further mobile ID TT cases should be analyzed to be able to generalize the concepts gained from the e-government TT from developed to developing countries.

Furthermore, the literature review on e-government TT and mobile ID was conducted. However, since there is a little prior research on this contemporary and evolving topic, the author has reviewed the literature from various disciplines including transfer of IT among governments, private sector stakeholders, or universities. The perceived problem was that significant concepts including elements, phases, stages and contextual (technological, organizational, and environmental) factors might be missing in the literature because of the different nature of the profit and non-profit organizations. However, a systematic and detailed review of the literature and the collection of the interview materials have confirmed all the findings with each other.

Lastly, since the mobile ID TT is such a novel phenomenon among the practitioners and researchers as well, and the value proposition of it is progressively growing for the developing countries' governments, there is a need for further exploration of e-government TT projects, namely the mobile ID projects between developed and developing countries. Thus, the author aims to contribute to the literature in this direction.

7 Conclusion

The implementation of the e-government projects has been progressively increasing around the world. Developing countries' governments, especially, have invested in the transfer of knowledge and experiences of the developed countries in order not to lag behind for the digitalization of their services (Chadwick & May, 2003; S. M. Lee et al., 2005). However, the e-government systems transfer is a complex process in which the technological, organizational, and environmental factors have to be taken into consideration which is also shown in this thesis (Mkude & Wimmer, 2015; Schuppan, 2009). As an example of e-government projects, e-ID solutions have become an inseparable part of the e-government projects because it is a foundation to access any government services in a virtual world. The mobile ID solution, among e-ID projects, has gained a great fame among the developing countries since it does not require to build very complex and costly network infrastructure by them (International Telecommunication Union (ITU) & Ministry of Digital Affairs of the Republic of Poland, 2017). Furthermore, the statistics has also shown the steady growth of mobile penetration rates around the world (Statista, 2019), therefore the mobile ID solution is considered the secure authentication method to access the governmental services and to strengthen their e-government systems in an electronic environment. The investigation of the e-government TT in a specific area of Azerbaijani government, namely the ASAN Imza (mobile ID) project which is based on the transfer of know-how from Estonian MNC and its partner companies to Azerbaijani mobile ID service provider and the State Tax Service under the Ministry of Economy is chosen as the study object.

To answer the research question *("What does the ASAN Imza (mobile ID) technology transfer project from Estonia to Azerbaijan tell us about the e-government technology transfer from developed to developing countries?")* a systematic literature review is executed by following the methods described by Webster and Watson (2002). Semi-structured interviews and document analysis results are transcribed and coded using the qualitative data analysis tool, MAXQDA. The results show a number of elements including the donor and recipient organizations, transfer object and transfer mechanisms; of phases of e-government TT project including pre-technology transfer, technology transfer, and post-technology transfer phases; and the stages of which capabilities or the recipient and adaptation are seen as the most important. Also, the contextual differences

of the countries are described using technological, organizational, and environmental factors that mediated the transfer process.

Even though, this thesis is not free of limitations, it has helped to provide a comprehensive understanding of the practices and different contextual factors of e-government TT projects by combining the e-government in developed and developing countries, TT, and mobile ID concepts. The findings regarding the elements, phases, stages and contextual factors between the countries serves as a foundation to the policymakers, researchers, and different international and multi-level practitioners of e-government TT projects.

To sum up, despite its limitations, the study contributes not only to the existing literature on e-government TT projects from developed to developing countries and mobile ID TT, but determines as well major elements, phases, and stages in the context of e-government TT, and contextual (technological, organizational, and environmental) factors mediating the transfer process.

References

Alasuutari, P., Bickman, L., & Brannen, J. (2008). *The SAGE Handbook of Social Research Methods*. SAGE.

Angelopoulos, S., Kitsios, F., & Papadopoulos, T. (2010). New service development in e-government: Identifying critical success factors. *Transforming Government: People, Process and Policy*, *4*(1), 95–118. https://doi.org/10.1108/17506161011028821

Attewell, P., & Rule, J. (1984). Computing and organizations: What we know and what we don't know. *Communications of the ACM*, *27*(12), 1184–1192. https://doi.org/10.1145/2135.2136

Avgerou, C., & Walsham, G. (Eds.). (2017). *Information Technology in Context: Studies from the perspective of developing countries*. Routledge. https://doi.org/10.4324/9781315187785

Azerbaijan. (2021). In *Wikipedia*. https://en.wikipedia.org/w/index.php?title=Azerbaijan&oldid=1037109224

Azerbaijan | Ministry of Foreign Affairs. (2019). https://vm.ee/en/countries/azerbaijan?display=relations

Baark, E., & Heeks, R. (1999). Donor-funded information technology transfer projects: Evaluating the life-cycle approach in four Chinese science and technology projects. *Information Technology for Development*, *8*(4), 185–197. https://doi.org/10.1080/02681102.1999.9525309

Barley, S. R. (2007). *Technology as an Occasion for Structuring: Evidence from Observations of CT Scanners and the Social Order of Radiology Departments*. 83–100. https://doi.org/10.1017/CBO9780511618925.007

Bar-Zakay, S. N. (1971). Technology Transfer Model. *Technological Forecasting and Social Change*, *2*(3–4), 321–337. https://doi.org/10.1016/0040-1625(71)90009-6

Belanger, F., & Carter, L. (2012). Digitizing Government Interactions with Constituents: An Historical Review of E-Government Research in Information Systems. *Journal of the Association for Information Systems*, *13*(5), 363–394. https://doi.org/10.17705/1jais.00295

Bell, M., & Albu, M. (1999). Knowledge Systems and Technological Dynamism in Industrial Clusters in Developing Countries. *World Development*, *27*(9), 1715–1734. https://doi.org/10.1016/S0305-750X(99)00073-X

Bozeman, B. (2000). Technology transfer and public policy: A review of research and theory. *Research Policy*, *29*(4), 627–655. https://doi.org/10.1016/S0048-7333(99)00093-1

Bozeman, B., Rimesb, H., & Youtie, J. (2015). The evolving state-of-the-art in technology transfer research: Revisiting the contingent effectiveness model. *Research Policy*, 16.

Cavalheiro, G. M. do C., & Joia, L. A. (2014). Towards a heuristic frame for transferring e-government technology. *Government Information Quarterly*, *31*(1), 195–207. https://doi.org/10.1016/j.giq.2013.09.005

Cavalheiro, G. M. do C., & Joia, L. A. (2016). E-Government Technology Transfer: A Case Study of the Implementation of a European Patent Management System in Brazil: E-Government Technology Transfer from Europe to Brazil. *Public Administration and Development*, *36*(3), 215–231. https://doi.org/10.1002/pad.1753

Chadwick, A., & May, C. (2003). Interaction between States and Citizens in the Age of the Internet: "E-Government" in the United States, Britain, and the European Union. *Governance*, *16*(2), 271–300. https://doi.org/10.1111/1468-0491.00216

Chen, Y. N., Chen, H. M., Huang, W., & Ching, R. K. H. (2006). E-Government Strategies in Developed and Developing Countries: An Implementation Framework and Case Study. *Journal of Global Information Management*, *14*(1), 23–46. http://dx.doi.org.kuleuven.e-bronnen.be/10.4018/jgim.2006010102

Choi, H. J. (2009). Technology Transfer Issues and a New Technology Transfer Model. *The Journal of Technology Studies*, *35*(1), 49–57. https://doi.org/10.21061/jots.v35i1.a.7

Ciborra, C. (2005). Interpreting e-government and development: Efficiency, transparency or governance at a distance? *Information Technology & People*, *18*(3), 260–279. http://dx.doi.org.kuleuven.e-bronnen.be/10.1108/09593840510615879

Collings, T. (2008). Some thoughts on the underlying logic and process underpinning Electronic Identity (e-ID). *Information Security Technical Report*, *13*(2), 61–70. https://doi.org/10.1016/j.istr.2008.06.002

Creswell, J. W., & Creswell, J. D. (2018). *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches*. 388.

Creswell, J. W., & Poth, C. N. (2017). *Qualitative Inquiry and Research Design: Choosing Among Five Approaches*. SAGE Publications.

Cutrell, J. D. (1990). Technology transfer systems for the coming decade. *Federal Highway Administration: Department of Transportation, Washington, DC*.

Dawes, S. S. (2008). The Evolution and Continuing Challenges of E-Governance. *Public Administration Review*, *68*, S86–S102. https://doi.org/10.1111/j.1540-6210.2008.00981.x

Dawes, S. S., Gharawi, M. A., & Burke, G. B. (2012). Transnational public sector knowledge networks: Knowledge and information sharing in a multi-dimensional context. *Government Information Quarterly*, 9.

de Andrade, N. N. G., de Andrade, N. N. G., Chen-Wilson, L., Argles, D., Wills, G., & Schiano di Zenise, M. (2014). *Electronic Identity, by Norberto Nuno Gomes de Andrade, Lisha Chen-Wilson, David Argles, Gary Wills, Michele Schiano di Zenise.* (1st ed. 2014.). Springer London : Imprint: Springer.

De Vries, H., Bekkers, V., & Tummers, L. (2016). INNOVATION IN THE PUBLIC SECTOR: A SYSTEMATIC REVIEW AND FUTURE RESEARCH AGENDA: INNOVATION IN THE PUBLIC SECTOR. *Public Administration*, *94*(1), 146–166. https://doi.org/10.1111/padm.12209

Deloitte. (2020). *Embracing mobile identity for eGovernment*. https://ec.europa.eu/cefdigital/wiki/display/EIDCOMMUNITY/Embracing+mobile+identity+for+eGovernment?preview=/232688243/232688247/Trends%20report%20on%20electronic%20identification_Mobile_FINAL.pdf

Derakhshani, S. (1984). Factors affecting success in international transfers of technology: A synthesis, and a test of a new contingency model. *Developing Economies*, *22*(1), 27–46, 47. https://doi.org/10.1111/j.1746-1049.1984.tb00650.x

Devadoss, P. R., Pan, S. L., & Huang, J. C. (2003). Structurational analysis of e-government initiatives: A case study of SCO. *Decision Support Systems*, *34*(3), 253–269. https://doi.org/10.1016/S0167-9236(02)00120-3

Dudley, J. R. (2006). Successful Technology Transfer Requires More Than Technical Know-How. *Biopharm International*, *19*(10), 68,70-71,74.

Eaton, B., Hedman, J., & Medaglia, R. (2018). Three different ways to skin a cat: Financialization in the emergence of national e-ID solutions. *Journal of Information Technology*, *33*(1), 70–83. http://dx.doi.org.kuleuven.e-bronnen.be/10.1057/s41265-017-0036-8

e-Estonia. (n.d.). *Mobile-ID*. E-Estonia. https://e-estonia.com/solutions/e-identity/mobile-id/

e-Governance Academy. (2018, June 11). *e-Gov 2018: “Estonia and Azerbaijan e-Government case study: scalability and proof of concept”* https://vimeo.com/274537129

E-Governance Agency, & Government of Moldova. (2015). *E-Governance Agency*. Mobile Signature. https://www.egov.md/en/projects/mobile-signature

Flannery, W. T., & Dietrich, G. (2000). *Technology transfer in a complex environment: Exploring key relationships*. 6.

Frey, R. E. (1987). Is there a philosophy of technology. *74th Mississippi Valley Industrial Teacher Education Conference, Chicago, IL*.

Gemalto. (2014). *WHITE PAPER - National Mobile ID schemes. Learning from today's best practices*.

George, J. F., & King, J. L. (1991). Examining the computing and centralization debate. *Communications of the ACM*, *34*(7), 62–72. https://doi.org/10.1145/105783.105796

Gerring, J. (2004). What Is a Case Study and What Is It Good for? *American Political Science Review*, *98*(2), 341–354. https://doi.org/10.1017/S0003055404001182

Ghobakhloo, M. (2012). *Strategies for Successful Information Technology Adoption in Small and Medium-sized Enterprises*. 32.

Ghobakhloo, M., Hong, T. S., Sabouri, M. S., & Zulkifli, N. (2012). Strategies for Successful Information Technology Adoption in Small and Medium-sized Enterprises. *Information*, *3*(1), 36–67. https://doi.org/10.3390/info3010036

Gibson, D. V., & Smilor, R. W. (1991). Key variables in technology transfer: A field-study based empirical analysis. *Journal of Engineering and Technology Management*, *8*(3), 287–312. https://doi.org/10.1016/0923-4748(91)90015-J

Giddens, A. (1984). *The Constitution of Society: Outline of the Theory of Structuration*. University of California Press.

Gil-García, J. R., & Pardo, T. A. (2005). E-government success factors: Mapping practical tools to theoretical foundations. *Government Information Quarterly*, *22*(2), 187–216. https://doi.org/10.1016/j.giq.2005.02.001

Grant, G., & Chau, D. (2005). *Developing a Generic Framework for E-Government*. 30.

Gupta, A. K., & Govindarajan, V. (2000). *Knowledge Flows within Multinational Corporations*. 25.

Hagood, J. D. (2006). Why Does Technology Transfer Fail? Two Technology Transfer Projects from Peronist Argentina. *Comparative Technology Transfer and Society*, *4*(1), 27.

Handy Signatur. (n.d.). *Herzlich willkommen: Handy-Signatur - Der digitale Ausweis*. HANDY-SIGNATUR. Retrieved July 21, 2021, from https://www.handy-signatur.at/hs2/

Heeks, R. (2002a). Information Systems and Developing Countries: Failure, Success, and Local Improvisations. *The Information Society*, *18*(2), 101–112. https://doi.org/10.1080/01972240290075039

Heeks, R. (2002b). E-Government in Africa: Promise and practice. *Information Polity*, *7*, 97–114. https://doi.org/10.3233/IP-2002-0008

Heeks, R. (2005). E-Government as a Carrier of Context. *Journal of Public Policy*, *25*(1), 51–74. https://doi.org/10.1017/S0143814X05000206

Heeks, R. (2006). *Implementing and Managing EGovernment: An International Text*. SAGE Publications.

Heeks, R., & Stanforth, C. (2015). Technological change in developing countries: Opening the black box of process using actor–network theory. *Development Studies Research*, *2*(1), 33–50. https://doi.org/10.1080/21665095.2015.1026610

Hilkevics, S., & Hilkevics, A. (2017). The comparative analysis of technology transfer models. *Entrepreneurship and Sustainability Issues*, *4*(4), 540–558. https://doi.org/10.9770/jesi.2017.4.4(11)

Hölzl, M., Roland, M., & Mayrhofer, R. (2018). Real-World Identification for an Extensible and Privacy-Preserving Mobile eID. In M. Hansen, E. Kosta, I. Nai-Fovino, & S. Fischer-Hübner (Eds.), *Privacy and Identity Management. The Smart Revolution: 12th IFIP WG 9.2, 9.5, 9.6/11.7, 11.6/SIG 9.2.2 International Summer School, Ispra, Italy, September 4-8, 2017, Revised Selected Papers* (pp. 354–370). Springer International Publishing. https://doi.org/10.1007/978-3-319-92925-5_24

Ibrahim, H. (2006). An approach to the development of information technology transfer methodology based on Actor-Network Theory. *Universiti Kebangsaan Malaysia.*

Ibrahim, H., & Kasimin, H. (2010). STRUCTURING A SUCCESSFUL INFORMATION TECHNOLOGY TRANSFER PROCESS: A CASE STUDY FROM THE PERSPECTIVES OF ACTOR NETWORK THEORY. *Journal of*

Information and Communication Technology. https://doi.org/10.32890/jict.9.2010.8097

International Telecommunication Union (ITU), & Ministry of Digital Affairs of the Republic of Poland. (2017). *Mobile identification: Implementation, challenges, and opportunities*. 30.

Itsme®. (n.d.). Itsme®. Retrieved June 26, 2021, from https://www.itsme.be/en/

Jagoda, K. I. (2007). A stage-gate model for planning and implementing international technology transfer. *Australia: University of Western Sydney*.

Jegathesan, J., Gunasekaran, A., & Muthaly, S. (1997). *Technology development and transfer: Experiences from Malaysia*. 19.

Juma, C., Yee-Cheong, L., & Innovation, U. M. P. T. F. on S., Technology, and. (2005). *Innovation: Applying Knowledge in Development*. Earthscan.

Khabiri, N., Rast, S., & Senin, A. A. (2012). Identifying Main Influential Elements in Technology Transfer Process: A Conceptual Model. *Procedia - Social and Behavioral Sciences*, *40*, 417–423. https://doi.org/10.1016/j.sbspro.2012.03.209

Khabiri, N., Rasta, S., & Senina, A. A. (2012). *Identifying Main Influential Elements in Technology Transfer Process: A Conceptual Model*. 7.

Khalil, T. (2012). *Management of Technology: The Key to Competitiveness and Wealth Creation* (3rd ed., Vol. 13). https://www.semanticscholar.org/paper/Management-of-Technology%3A-The-Key-to-and-Wealth-Khalil/054d33ff9b38d8a4dbe94a0903fe8527c3496144

Kling, R., & Scacchi, W. (1982). *The Web of Computing: Computer Technology as Social Organization* (M. C. Yovits, Ed.; Vol. 21, pp. 1–90). Elsevier. https://doi.org/10.1016/S0065-2458(08)60567-7

Kogut, B., & Zander, U. (1992). Knowledge of the Firm, Combinative Capabilities, and the Replication of Technology. *Organization Science (Providence, R.I.)*, *3*(3), 383–397. https://doi.org/10.1287/orsc.3.3.383

Krimpe, J. (n.d.). *B.EST SOLUTIONS PORTFOLIO OVERVIEW*. Retrieved July 21, 2021, from https://drive.google.com/file/d/14_eaQxnLnRmSqCZ9ow4MuZStiY3c9h0m/view?usp=drive_web&usp=embed_facebook

Krimpe, J. (2014). Mobile ID: Crucial element of m-Government. *Proceedings of the 2014 Conference on Electronic Governance and Open Society: Challenges in Eurasia - EGOSE '14*, 187–194. https://doi.org/10.1145/2729104.2729133

Lee, C., Chang, K., & Berry, F. S. (2011). Testing the Development and Diffusion of E-Government and E-Democracy: A Global Perspective. *Public Administration Review*, *71*(3), 444–454. https://doi.org/10.1111/j.1540-6210.2011.02228.x

Lee, S., Kim, B. S., Kim, Y., Kim, W., & Ahn, W. (2018). The framework for factors affecting technology transfer for suppliers and buyers of technology in Korea. *Technology Analysis & Strategic Management*, *30*(2), 172–185. https://doi.org/10.1080/09537325.2017.1297787

Lee, S. M., Tan, X., & Trimi, S. (2005). Current practices of leading e-government countries. *Communications of the ACM*, *48*(10), 99–104. https://doi.org/10.1145/1089107.1089112

Lentner, G. M., & Parycek, P. (2016). Electronic identity (eID) and electronic signature (eSig) for eGovernment services—A comparative legal study. *Transforming Government: People, Process and Policy*, *10*(1), 8–25. http://dx.doi.org.kuleuven.e-bronnen.be/10.1108/TG-11-2013-0047

Leonardi. (2011). When Flexible Routines Meet Flexible Technologies: Affordance, Constraint, and the Imbrication of Human and Material Agencies. *MIS Quarterly*, *35*(1), 147. https://doi.org/10.2307/23043493

Lind, P. (2020). *Computerization in Developing Countries: Model and Reality*. https://doi.org/10.4324/9781351142281

Luna-Reyes, L. F., Gil-Garcia, J. R., & Romero, G. (2012). Towards a multidimensional model for evaluating electronic government: Proposing a more comprehensive and integrative perspective. *Government Information Quarterly*, *29*(3), 324–334. https://doi.org/10.1016/j.giq.2012.03.001

Madu, C. N. (1989). Transferring technology to developing countries—Critical factors for success. *Long Range Planning*, *22*(4), 115–124. https://doi.org/10.1016/0024-6301(89)90089-7

Majaski, C. (2020). *Developed Economy*. Investopedia. https://www.investopedia.com/terms/d/developed-economy.asp

Mansfield, E., Romeo, A., & Schwartz, M. (1982). *Technology transfer, productivity and economic policy, Mansfield, Edwin ; Romeo, Anthony ; Schwartz, Mark ; e. A.* Norton.

Markus, M. L., & Robey, D. (1988). Information Technology and Organizational Change: Casual St. *Management Science*, *34*(5), 583–598. https://doi.org/DOI: 10.1287/mnsc.34.5.583

Mates, P., Lechner, T., Rieger, P., & Pekná, J. (2013). Towards e-Government project assessment: European approach*1. *Zbornik Radova Ekonomski Fakultet u Rijeka*, *31*(1), 103–125.

Melin, U., Axelsson, K., & Söderström, F. (2016). Managing the development of e-ID in a public e-service context. *Transforming Government: People, Process and*

Policy, *10*(1), 72–98. http://dx.doi.org.kuleuven.e-bronnen.be/10.1108/TG-11-2013-0046

Merriam, S. B., & Tisdell, E. J. (2016). *Qualitative Research: A Guide to Design and Implementation*. 371.

Ministry of Technology and Communications. (2019). *Digital Identity—Omanuna Portal*. Digital Identity. https://omanportal.gov.om/wps/portal/index/sso/!ut/p/a1/hc5NC4JAEAbg39LBqzO2YtltS_owRUop3UtobKuhbqgl_ftMugR9zO0dnpcZYBACK-NbJuImk2WcPzMzDt5GM7Slh2tv5hCk29HU8gPUMMAORB3AL0PxX38PrCcEF4ieuXLXgUtxSHZz23QMYln6C_w44fMSbGAil0n_ckTLhIwFsIqfeMUr9Vp167RpLvVEQQXbtlWFlCLn6lEWCn6qpLJuIHyXcClCPOssubd08ADGhwRd/dl5/d5/L0lKQSEvUUt3RS80RUkhL2Vu/

Mir, U. B., Kar, A. K., & Gupta, M. P. (2020). Digital Identity Evaluation Framework for Social Welfare. In S. K. Sharma, Y. K. Dwivedi, B. Metri, & N. P. Rana (Eds.), *Re-imagining Diffusion and Adoption of Information Technology and Systems: A Continuing Conversation* (Vol. 617, pp. 401–414). Springer International Publishing. https://doi.org/10.1007/978-3-030-64849-7_36

Mkude, C. G., & Wimmer, M. A. (2015). E-government Systems Design and Implementation in Developed and Developing Countries: Results from a Qualitative Analysis. In E. Tambouris, M. Janssen, H. J. Scholl, M. A. Wimmer, K. Tarabanis, M. Gascó, B. Klievink, I. Lindgren, & P. Parycek (Eds.), *Electronic Government* (Vol. 9248, pp. 44–58). Springer International Publishing. https://doi.org/10.1007/978-3-319-22479-4_4

Müller, S. D., & Skau, S. A. (2015). Success factors influencing implementation of e-government at different stages of maturity: A literature review. *International*

Journal of Electronic Governance, *7*(2), 136. https://doi.org/10.1504/IJEG.2015.069495

OECD & International Telecommunication Union. (2011). *M-Government: Mobile Technologies for Responsive Governments and Connected Societies*. OECD. https://doi.org/10.1787/9789264118706-en

Organisation for Economic Cooperation and Development (OECD). (2014). National digital Identity and legally binding e-signatures based on Mobile-ID technology branded "Asan Imza" from the Republic of Azerbaijan. *Observatory of Public Sector Innovation*. https://oecd-opsi.org/innovations/national-digital-identity-and-legally-binding-e-signatures-based-on-mobile-id-technology-branded-asan-imza-from-the-republic-of-azerbaijan/

Orlikowski, W. J. (1992). The Duality of Technology: Rethinking the Concept of Technology in Organizations. *Organization Science*, *3*(3), 398–427. https://doi.org/10.1287/orsc.3.3.398

Orlikowski, W. J., & Barley, S. R. (2001). Technology and Institutions: What Can Research on Information Technology and Research on Organizations Learn from Each Other? *MIS Quarterly*, *25*(2), 145. https://doi.org/10.2307/3250927

Orlikowski, W. J., & Iacono, C. S. (1999). *The Truth Is Not Out There: An Enacted View of the "Digital Economy."* 352–380.

Orlikowski, W. J., & Iacono, C. S. (2001). Research Commentary: Desperately Seeking the "IT" in IT Research—A Call to Theorizing the IT Artifact. *Information Systems Research*, *12*(2), 121–134. https://doi.org/10.1287/isre.12.2.121.9700

Patton, M. Q. (2015). *Qualitative research & evaluation methods: Integrating theory and practice* (Fourth edition). SAGE Publications, Inc.

Ramanathan, K. (2001). E-strategies for technological capability development. *PICMET '01. Portland International Conference on Management of Engineering and Technology. Proceedings Vol.1: Book of Summaries (IEEE Cat. No.01CH37199)*, 147. https://doi.org/10.1109/PICMET.2001.951872

Reddy, N. M., & Zhao, L. (1990). International technology transfer: A review. *Research Policy*, *19*(4), 285–307. https://doi.org/10.1016/0048-7333(90)90015-X

Rössler, T. (2008). Giving an interoperable e-ID solution: Using foreign e-IDs in Austrian e-Government. *Computer Law & Security Review*, *24*(5), 447–453. https://doi.org/10.1016/j.clsr.2008.07.006

Sæbø, Ø. (2012). E-government in Tanzania: Current status and future challenges. *Lecture Notes in Computer Science (Including Subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics)*, *7443 LNCS*, 198–209. Scopus. https://doi.org/10.1007/978-3-642-33489-4_17

Schedler, K., Guenduez, A. A., & Frischknecht, R. (2019). How smart can government be? Exploring barriers to the adoption of smart government. *Information Polity*, *24*(1), 3–20. https://doi.org/10.3233/IP-180095

Schuppan, T. (2009). E-Government in developing countries: Experiences from sub-Saharan Africa. *Government Information Quarterly*, *26*(1), 118–127. https://doi.org/10.1016/j.giq.2008.01.006

Seawright, J., & Gerring, J. (2008). Case Selection Techniques in Case Study Research: A Menu of Qualitative and Quantitative Options. *Political Research Quarterly*, *61*(2), 294–308. https://doi.org/10.1177/1065912907313077

Secure Identity Alliance, & onepoint. (2021). *Giving Voice to Digital Identities Worldwide—Key insights and experiences to overcome shared challenges*.

https://secureidentityalliance.org/utilities/news-en/entry/giving-voice-to-digital-identities-worldwide-1-1

Stanforth, C. (2006). Using Actor-Network Theory to Analyze E-Government Implementation in Developing Countries. *Information Technologies and International Development, 3*(3), 35–60. https://doi.org/10.1162/itid.2007.3.3.35

Statista. (2019). *Mobile subscriptions worldwide 1993-2019*. Statista. https://www.statista.com/statistics/262950/global-mobile-subscriptions-since-1993/

Subramanian, A., & Nilakanta, S. (1996). Organizational innovativeness: Exploring the relationship between organizational determinants of innovation, types of innovations, and measures of organizational performance. *Omega, 24*(6), 631–647. https://doi.org/10.1016/S0305-0483(96)00031-X

Suokas, A., Kerttula, E., Ltd, P., Kinnunen, J., Mitrunen, J., Koskela, K., Mäkinen, K., Jelekäinen, P., Svento, R., & Pyhala, T. (n.d.). *Pekka Turpeinen, Telia Sonera Janne Jutila, Elisa Perttu Hörkkö, Elisa Lasse Leppänen, DNA*. 20.

Technology transfer. (2021). In *Wikipedia*. https://en.wikipedia.org/w/index.php?title=Technology_transfer&oldid=1014580067

Tsap, V., Pappel, I., & Draheim, D. (2017). Key Success Factors in Introducing National e-Identification Systems. In T. K. Dang, R. Wagner, J. Küng, N. Thoai, M. Takizawa, & E. J. Neuhold (Eds.), *Future Data and Security Engineering* (pp. 455–471). Springer International Publishing. https://doi.org/10.1007/978-3-319-70004-5_33

United Nations. (2020). *United Nations e-Government Survey*. https://publicadministration.un.org/egovkb/en-us/Reports/UN-E-Government-Survey-2020

United Nations Publications. (2020). *United Nations E-Government Survey 2020*. UN.

van Thanh, D., Huy, N. P., & Khuong, L. H. (2012). Mobile identity as social economic enabler. *2012 7th International Conference on Computing and Convergence Technology (ICCCT)*, 6.

Vodafone Türkiye. (2021). *Mobil İmza Servisi*. Vodafone. https://www.vodafone.com.tr/servisler/mobil-imza-servisi

Webster, J., & Watson, R. T. (2002). Analyzing the Past to Prepare for the Future: Writing a Literature Review. *MIS Quarterly*, *26*(2), xiii–xxiii.

Wei Choo, C., & Johnston, R. (2004). Innovation in the knowing organization: A case study of an e-commerce initiative. *Journal of Knowledge Management*, *8*(6), 77–92. https://doi.org/10.1108/13673270410567648

What is the Asan İmza? | Asan İmza. (n.d.). Azan Imza. Retrieved June 27, 2021, from https://asanimza.az/asan-imza-en/2013/what-is-the-asan-imza-mobile-id/

Wu, X., Fan, Y., Zhang, X., & Xu, J. (2015). Research of eID Mobile Identity Authentication Method. In L. Yueming, W. Xu, & Z. Xi (Eds.), *Trustworthy Computing and Services* (pp. 350–358). Springer. https://doi.org/10.1007/978-3-662-47401-3_46

Yildiz, M. (2007). E-government research: Reviewing the literature, limitations, and ways forward. *Government Information Quarterly*, *24*(3), 646–665. https://doi.org/10.1016/j.giq.2007.01.002

Yin, R. K. (2018). *Case Study Research and Applications: Design and Methods*. SAGE Publications.

Zefferer, T., & Teufl, P. (2015). Leveraging the Adoption of Mobile eID and e-Signature Solutions in Europe. In A. Kő & E. Francesconi (Eds.), *Electronic Government and the Information Systems Perspective* (pp. 86–100). Springer International Publishing. https://doi.org/10.1007/978-3-319-22389-6_7

Appendix

A Data Analysis Content

Interviews

#	Date	Channel	Interview
1	20.05.2021	Teams	Transfer of ASAN Imza
2	12.07.2021	Teams	Transfer of ASAN Imza
3	13.07.2021	Zoom	Transfer of ASAN Imza
4	14.07.2021	Zoom	Transfer of ASAN Imza
5	15.07.2021	F2F	Transfer of ASAN Imza
6	15.07.2021	F2F	Transfer of ASAN Imza
7	16.07.2021	Zoom	Transfer of ASAN Imza
8	16.07.2021	Zoom	Transfer of ASAN Imza
9	19.02.2021	Teams	Preliminary Discussion

Table 2. List of Interviews conducted for this research

Documentation

#	Documentation type	Author/Organization	Topic
1	Presentation	Jana Krimpe	B.est Solutions Portfolio Overview
2	Article/Presentation	International Telecommunication Union and Ministry of Digital Affairs of the Republic of Poland	Expert Group Meeting on the best practices in implementation of mobile identification (mID)
3	Report	Secure Identity Alliance and one point	Giving Voice to Digital Identities Worldwide

Table 3. List of Documentation used for this research

B Coding Results

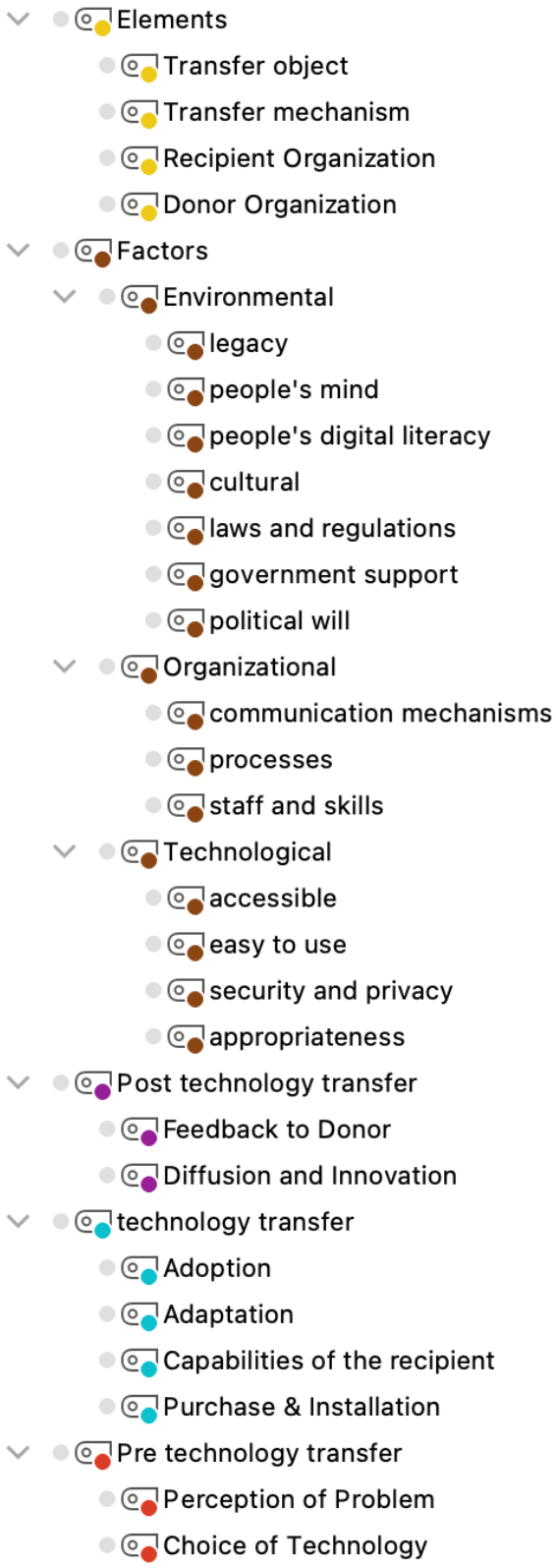


Table 4. Coding of the data results

C Semi-Structured Interview Questions

1. Perception of the Problem:
How did you come up with the Mobile ID project?
Were there any problems in place that you wanted to solve it with the provision of Mobile ID?
2. Choice of Technology
How did you choose this exact project? And why? Were there other solutions available?
3. Purchase and Installation
Did you need to buy relevant software and hardware for the implementation of Mobile ID?
4. Technological, managerial, and organizational capability of the recipient
Did you and your team attended any trainings to learn technological, managerial, and organizational capabilities? Or did you need additional assistance from Estonia to tackle the problems created?
5. Adaptation
How did the adaptation process happen?
How did you deal with the integration of Mobile ID with other existing system?
Were there any problems when you integrated Mobile ID to existing systems? Did you have to change anything?
6. Adoption
Was the adoption of Mobile ID difficult? If yes, what made it easy to be adopted?
Were you provided with trainings on how to use the new project? (Employees)
7. Diffusion and Innovation

Did you need to apply small incremental innovations for the diffusion of Mobile ID?
8. Feedback to Donor
Did you provide feedback to Estonia regarding the implementation or challenges of Mobile ID project? Or were you more independent?
9. Contextual Distances (technological, organizational, and environmental)
What do you think are the most important differences between Estonian Mobile ID and Azerbaijani Mobile ID?

Table 5. List of the Interview Questions

Declaration of Authorship

I hereby declare that, to the best of my knowledge and belief, this Master Thesis titled "**E-Government Technology Transfer Project from Developed to Developing Countries. A Case Study of the Implementation of the ASAN Imza (Mobile ID) in Azerbaijan**" is my own work. I confirm that each significant contribution to and quotation in this thesis that originates from the work or works of others is indicated by proper use of citation and references.

Estonia, 09.08.2021

Bahar Asgarova

Consent Form

for the use of plagiarism detection software to check my thesis

Name: Asgarova
Given Name: Bahar
Student number: R0769676
Course of Study: Public Sector Innovation and eGovernance
Address: Roosikrantsi 21, 1, 10119 Tallinn
Title of the thesis: E-Government Technology Transfer Project from Developed to Developing Countries. A Case Study of the Implementation of the ASAN Imza (Mobile ID) in Azerbaijan

What is plagiarism? Plagiarism is defined as submitting someone else's work or ideas as your own without a complete indication of the source. It is hereby irrelevant whether the work of others is copied word by word without acknowledgment of the source, text structures (e.g. line of argumentation or outline) are borrowed or texts are translated from a foreign language.

Use of plagiarism detection software. The examination office uses plagiarism software to check each submitted bachelor and master thesis for plagiarism. For that purpose the thesis is electronically forwarded to a software service provider where the software checks for potential matches between the submitted work and work from other sources. For future comparisons with other theses, your thesis will be permanently stored in a database. Only the School of Business and Economics of the University of Münster is allowed to access your stored thesis. The student agrees that his or her thesis may be stored and reproduced only for the purpose of plagiarism assessment. The first examiner of the thesis will be advised on the outcome of the plagiarism assessment.

Sanctions. Each case of plagiarism constitutes an attempt to deceive in terms of the examination regulations and will lead to the thesis being graded as "failed". This will be communicated to the examination office where your case will be documented. In the event of a serious case of deception the examinee can be generally excluded from any further examination. This can lead to the exmatriculation of the student. Even after completion of the examination procedure and graduation from university, plagiarism can result in a withdrawal of the awarded academic degree.

I confirm that I have read and understood the information in this document. I agree to the outlined procedure for plagiarism assessment and potential sanctioning.

Estonia, 09.08.2021

Bahar Asgarova