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Master's Thesis of Public Administration

Digital Divide in Public Service Rendering
- Azerbaijan's Case -

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Abstract

Digital Divide in Public Service Rendering Azerbaijan's Case

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Information and communication technologies can grant substantial benefits for those who are capable of operating in a digital environment. Those standing on the other side of the divide put themselves into the underprivileged category of society. In an environment where digitalization progress at a rapid pace in the Republic of Azerbaijan, the prima facie for the urban-rural digital divide is generally recognized, but the elaborate details of the divide patterns have not been researched or reported to the public so far. In this thesis, the researcher delves into data in an attempt to identify the extent of the digital divide in the Republic of Azerbaijan and detect the most vulnerable categories of society regarding the digitalization process. Based on the specific data for this purpose, the study demonstrates the inferences of digital exclusion in public service rendering in the regions, and territories outside the capital city of the subject country. The thesis has produced findings based on the statistical analysis results mainly carried out via multiple regression analysis including several categories of the subject country's society. Examples of the current Azerbaijani policymaking have been reviewed in the study and policy recommendations have been made in order to increase digital connectivity. The thesis may be considered applicable to the case of other post-Soviet and peer countries. Vis-à-vis the digitalization process, future digital protection policies are called upon in every country considering the trend that privileged segments get more and more digitalized while leaving the underprivileged in a broader gap.

Keywords: Azerbaijan, digital divide, digital literacy, ICT, public services

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Abbreviations

ASAN – Azerbaijan Service Assessment Network
CIS - Commonwealth of Independent States
DPS – Digital Public Services
ECLAC – Economic Commission for Latin America and the Caribbean
EGDC – E-Gov Development Centre
EU - European Union
GSM - Global System for Mobiles
ICT – Information and Communication Technology
IoT - Internet of Things
IXT – Internet Exchange Point
MDDT – Ministry of Digital Development and Transport
MoU - Memorandum of Understanding
NAR – Nakhchivan Autonomous Republic
NGO – Non-Government Organization
NRA – National Regulatory Authority
OECD – Organization for Economic Co-operation and Development
SEC - State Exam Center
StatCom - State Statistical Committee of the Republic of Azerbaijan

Chapter 1. Introduction

a. Background to the Thesis

As we commenced the 21st century, advances in Information and Communication Technology (hereafter, ICT) took a rapid speed and significantly augmented the contact between individuals and technologies by shifting the societal behavior globally in numerous ways, thus, becoming the subject of considerable debates. Benefits obtained from the digital world are far-reaching and stretch from eCommerce and eHealth to information sharing and digital public services. Therefore, it does not come as a surprise why governments promote digital transformation so rigorously and adopt numerous national policies and strategies to achieve their digital targets. By supporting digital policies at a national level, governments encourage the private sector as well as public institutions to transform digitally and establish a public-private partnership. The main interest behind governments' intention is cost-saving and hindering bureaucracy & corruption-related practices on the street level, especially in developing countries that lack long-established governance.

Putting all the good intentions aside, practitioners and scholars alike became aware of the problems that may pertain to the digitalization process – exclusion from the benefits of the digital world. Factors of exclusion are abundant and they extend from socio-cultural issues to economic reasons. Hence, not everybody is provided equal opportunities to step into the digital future along the same starting line. The critical role of ICT is undeniable and widely accepted, although stark digital divides exist both between developed and developing countries as well as country-specific issues which limit the potential effects of ICT on welfare (Millard, 2015).

The idea of the “Digital Divide” denotes the uneven opportunities between underprivileged members of society and privileged ones with access to economic (material) and information (non-material) resources. Many factors consist of the notion of the divide – race, age, gender, language, social status, income level, place of residence, etc. Some of them are more adamant than another. For example, the divide is usually bigger for girls and women than for boys and men in developing countries. Also, some areas still experience a problem with access to the internet where it is either limited, unavailable, or unaffordable which leaves numerous students, scholars, and professionals

without access to digital resources. Guaranteeing access to the internet does not solve the digital divide issue either. Even with internet access, low-income families cannot gain easy access to electronic devices to participate in digital space. In the bigger picture, access to the internet and tools fade behind the notion of what scholars describe as “beyond access”. The term “beyond access” entails a new approach to the discipline that some scholars perceive as the digital divide is impossible to close but potentially conceivable to reduce. The notion argues that this phenomenon must take into account the issues such as “real access”, “reach” and “socially responsible connectivity” (Hill, Owens, Beynon-Davies, & Williams, 2004).

During the past 2 decades, multiple initiatives have been carried out globally both at international and national levels to close the gap between digitally privileged and underprivileged populations. Reducing the digital gap also managed to enter into the political agenda and national strategies of many governments. The Danish government presented its new “Digital Growth Strategy” in 2018, which envisages a special strategy, “Digital Skills for All” and framework actions for getting one and all aboard (Danish Government, 2018). Moreover, OECD Recommendation on Digital Government Strategies recommends measures to address present “digital divides” and evade the rise of new forms of exclusion, namely “digital exclusion” (OECD, Recommendation on Digital Government Strategies, 2014). The government of Singapore undertakes several initiatives to bring digital technologies close to the people by piloting digital services in vernacular languages, in line with the Digital Readiness Blueprint with a vision to create a government “Digital to the Core, and Serves with Heart”. (Singapore Government, 2020). UN’s Economic Commission for Latin America and the Caribbean unveiled a digital agenda in 2021 and devoted a special chapter to digital inclusion with policy recommendations on how to universalize access in Latin American countries (ECLAC, 2021).

Governments resorted to establishing new agencies or other forms of public institutions to assume the responsibilities related to digital transformation. Some of these authorities also took the task of eliminating or partially reducing digital illiteracy. The big question remains unanswered which is how these agencies tackle the public administration problem that is new to the governance and traditionally has been subject to the operation interests of NGOs. However, scientific researches indicate that the countries establishing national regulatory authority for information technology and communication have a bigger online presence than the ones that do not possess nationwide

regulatory authority (Gulati, Yates, & Tawileh, 2010). Thus, the government's optimal action to accelerate bridging the digital divide is increasing the competition in local ICT services by exploiting the benefits of founding national regulatory authorities (hereafter, NRA) than establishing different government organizations to address the digital divide.

The COVID-19 pandemic played the role of catalyst and no doubt accelerated the digital transition by encouraging the use of digital tools to fight the pandemic outbreak. Despite, some online presence may deteriorate after COVID-19 restrictions are relaxed, fields such as teleworking, eCommerce, eHealth, and ePayment are expected to preserve their gains where the pandemic acted as catalysis. However, governments should be aware of the fact that the increased dependence on digital tools may create a new digital divide or aggravate the existing ones (OECD, Bridging Divides, 2020). For instance, dissemination of information was swiftly moved to online platforms due to COVID-19 which put the people with bad or no access (especially elderly, low educated, and low-income) at disadvantage for searching and obtaining reliable government instructions on how to protect against the virus and what steps to follow if infected. A study found that people with a positive attitude towards the use of the internet, good connection, and good physical access benefitted the most from pandemic information dissemination (Deursen A. J., 2020).

Although it is largely perceptible in developing countries, the issue of the digital divide also persists in developed countries. In 2015, U.S. President Barack Obama's Economic advisors carried out a study to find the major digital divide categories in the U.S.A. and they came to the conclusion that the digital divide in the U.S. is far beyond the urban-rural phenomenon, but significant disparities exist in education, income and race categories too (U.S. Government, 2015). The Danish government was one of the first national governments to recognize the disparity between the younger and the elderly. After a report published by the Ministry of Research in 1998 which showed that only 4% of the population over 60 years of age use the internet to some extent, the Minister recommended two main organizations dealing with the senior population to take appropriate steps (Jæger, 2012). Following the appeal, The Danish Association of Senior Citizens set up telecentres for the elderly citizens, and the DanAge Association created call centers to train the seniors on ICT usage within the framework of Senior Surf Days (Jæger, 2012). Denmark has been consistently considering the digital divide issue in its national strategies and the National Action plan of 2013-2014 stipulates a clause that *Everybody will be taken care of* (The Danish

Government, 2013). UK's main focus on digital inclusion has been concentrated on low-income families for whom it has set up 6,000 federated "UK online centers" in England to train and advice the use of computers and the Internet (EIU, 2008).

In Azerbaijan, the government takes the responsibility for closing the digital gap which stems from its desire to become a major ICT hub in the region. Several government organizations such as the E-Gov Development Centre (hereafter, EGDC) and the Ministry of Digital Development and Transport (hereafter, MDDT) assume various projects to increase digital awareness and reduce the gap among social categories. They both follow different paths to achieve their goals. EGDC focuses on increasing awareness of the digital divide and filling the digital knowledge gap by informing citizens through mass media and in the ASAN Service Centers. It organizes the annual "Towards Digital Journalism" project to train the journalists on digital public services who in turn enlighten the citizens via media channels (EGDC, EHM "Rəqəmsal Jurnalistikaya doğru" programına yekun vurub, 2021). Ministry of Digital Development and Transport established and supervises ICT Lab in order to teach efficient use of ICT for different segments of society and promote it.

In the present study, analysis focus on the digital divide issues in Azerbaijan and attempts to find among which categories the digital divide issue is more persistent. Azerbaijan ranks 19th among 141 countries for digital skills among the active population according to the World Competitiveness Index 2019 (Schwab, 2019), however, the study believes that digital knowledge has been unevenly distributed, especially among the regions of Azerbaijan. Comparisons based on the economic region division of Azerbaijan were chosen for the study employing different characteristics – population, education level, age groups, gender, and linguistic abilities.

This study anchors itself academically to the terminology called "*digital divide*", in other words – the knowledge or socio-economic gap between those having and not having access to the novel methods of information technology (Dijk J. A., 2006). However, the term does not have a universally accepted concept or definition, therefore, the research bases itself on the claims of the conceptual framework of the digital divide in the study. Despite its wide use in the academic sphere, conventional public administration researchers seem reluctant and indifferent to the topic. Moreover, the issue of the digital divide has not been discussed on the top policy level in the base country of the study and is far from the desired attention given to it globally. Accordingly, the

current thesis contributes to the pool of knowledge in digital divide research and sheds light on its implications in the Republic of Azerbaijan.

b. Background to the Country Context

The government of Azerbaijan devices to establish a leading role in the Information and Communication Technologies and turn Azerbaijan into a major ICT hub in the entire Caucasus region. Its desire was manifested by a Presidential Ordinance on the State Program for the implementation of the National Strategy for the Development of the Information Society in the Republic of Azerbaijan for 2016-2020 that outlined an Action Plan with 51 steps, which are still in the implementation process (President of Azerbaijan, № 2345, 2016). Hence, it intends to become a high-income country in the region whose backbone would be ICT (President of Azerbaijan, PrezidentAZ, 2012). The ICT sector of Azerbaijan has been expanding at a rapid speed of 25-30% per year since 2005 (Yearbook, StatCom, 2014; 2021). The main reason behind the success story of the country lies in the government's recognition of over-dependence on the petroleum industry and its endeavors to transit into a knowledge economy by 2025. The number of internet users in Azerbaijan peaked at 84.6% in 2020 compared to 17% in 2005 (Yearbook, IS Yearbook, 2021) (Table 1).

The country's e-Government has been growing rapidly as well and currently offers more services than demanded by the population. However, the main issue in e-Government development is the necessity to take measures against cyber threats and enhance the use of gCloud. For the smooth progress of digital public services, Azerbaijan needs to coordinate between public institutions to digitize and standardize documents and forms as well as promote digital literacy.

The biggest digital project of the Azerbaijani government is called the Azerbaijan Digital Hub program campaigned by AzerTelecom which intends to turn Azerbaijan into a regional digital hub connecting Europe and Asia with web traffic by taking advantage of the country's geographical position. By doing so, the project envisages making the city of Baku appear on Internet Exchange Point (IXP) and providing 1.8 billion people with digital services (Baghirov, 2020). The Global Competitiveness Report 2019 ranked Azerbaijan 19th among the surveyed countries for its digital skills among the active population as well as 21st for the growth of innovative companies among 141 surveyed countries (Schwab, 2019). Nevertheless, the Azerbaijani government fails to utilize

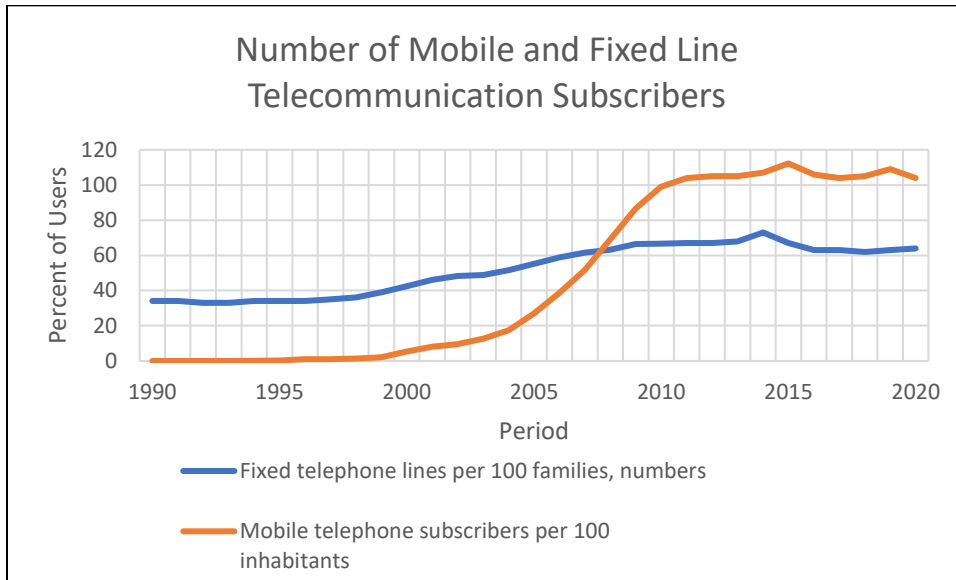
its level of ICT infrastructure to attain the anticipated outcomes, which have been described in the National ICT Strategic Road Map.

The main key issue for improving public digital services are closely related to the development of the ICT sector in the country overall. First of all, Azerbaijan needs to create a regulatory sector (in form of an agency) to safeguard equal treatment of the players in the ICT sector. This factor is especially important when a country's major telecommunication operators are state-owned as is the case in Azerbaijan. Although the ICT Roadmap of 2016 is calling for such a regulatory system, remarkable improvements have not been made so far due to the outbreak of COVID-19 pandemics during the last 2 years and the escalation of the Nagorno-Karabakh conflict. The lack of a regulatory system also hinders the dynamism, innovation, and investment in the ICT sector. Another solution to the problem would be privatizing the state-owned ICT enterprises in the country to boost the transparency of the sector which is another issue in the ICT development of Azerbaijan.

The country's fixed telephone line network is very diverse and major operators include Aztelekom LTD, Baku Telephone Communication (BTC) LTD, Ultel LTD, Az-Evro-Tel LTD, Delta Telecom LTD beside other smaller operators as NAXTEL LLC, which was founded in 2015 in the Nakhchivan Autonomous Republic (hereafter, NAR). As of 2020, there were 1.485 million fixed-line telephone subscribers out of which 1.369 million were home subscribers (StatCom, 2021) (Chart 1). Although the number of mobile phones has been on the rise over the last decade in Azerbaijan, the number of fixed-line telephone subscribers has remained steady, unlike in most other countries according to the statistics from the State Statistical Committee of the Republic of Azerbaijan (hereafter, StatCom) (StatCom, 2021).

Currently, three private mobile companies operate in Azerbaijan – Azercell, Bakcell, and Azerfon (with a commercial name Nar Mobile). All three of them offer GSM, 3G, and 4G mobile services whereas only Azercell offers 5G services since 2019 in partnership with Ericson by a Memorandum of Understanding (MoU). The same MoU outlines that Ericson will cooperate with Azercell to introduce Internet of Things (IoT) technology in the mining industry, agriculture, manufacturing, housing, and communal services (Ericson, 2019).

Chart 1: Telecommunication Subscribers in Azerbaijan



Data Source: State Statistical Committee of the Republic of Azerbaijan

While the digital gap is not significant nationwide according to international reports, there is a noteworthy 20% internet penetration gap between the rural and urban areas and it changes among the regions (Yearbook, IS Yearbook, 2021). The main reason for the existing gap is due to the fixed infrastructure shortage and also the rural population's relatively lower level of digital literacy. Therefore, the Azerbaijani government stresses special attention to enhancing the digital skills of the rural population in its digital agenda through social campaigns and incentives, since the rural segment pulls the country's overall digital literacy level down. The Ministry of Digital Development and Transport considers Azerbaijan's digital literacy level somehow satisfactory while it also recognizes the need for refining digital skills for the remaining members of the society. The Ministry informs that 53% of the population is capable of utilizing digital technologies and this rate is very close to the developed countries' digital literacy level (EU, 2021) (Table 1).

To sum up, in order to raise the digital service quality in Azerbaijan, the government needs to foster a transparent and fair environment in order to better utilize the available human and infrastructure resources. Moreover, the government has to guarantee that the population possesses essential digital knowledge and has access to affordable digital tools to benefit from the digital environment and increase the demand for digital services as well as increase the participation of

private sector to expand a national broadband network in the country which requires a thorough broadband plan with a strong political will.

Table 1: General Statistics of Internet Users in Azerbaijan

Indicator	Percent of Users
Total Internet Users	85%
Gender	
Male Users	53.8%
Female Users	46.2%
Age	
0-24	39.9%
25-35	25.8%
36-64	34.2%
65 and over	0.1%
Education	
Low Education	59.8%
Moderate Education	17.8%
High Education	22.4%
Types of Internet Connection	
Broadband	72.0%
Mobile phone	25.2%
Other	2.8%
Activities on Internet	
Looking for Information	18.2%
E-mail and Professional	17.0%
Communication	22.7%
Calls and file sharing (peer-to-peer)	17.2%
Streaming & Entertainment	18.1%

Creating a Web-page	6.6%
Other	0.2%

Data Source: Information society in Azerbaijan, Statistical yearbook, State Statistical Committee of the Republic of Azerbaijan. Baku, 2021.

c. Purpose and Research Questions

The aim of the Azerbaijani government has long been to digitize public services completely and transform them into non-stop-shop from one-stop-shop public services. After the de-occupation of Azerbaijan's 20% territories whose entire infrastructure have been destroyed by the Armenian Armed Forces, Azerbaijan commenced to rebuild them with the concept of Smart City, which heavily relies on the utilization of cutting-edge ICT technologies as well as satisfactory digital knowledge by the population to benefit from the advantages of Smart (Hajiyeva, 2021). In parallel to the Smart City Projects in the Karabakh region, Azerbaijan commenced completely digitizing the local and municipal governments in the regions outside Baku. For this purpose, as an initial step, it started three pilot projects in three different cities of Azerbaijan in cooperation with international partners and later announced further digitization of public services in other cities (EGDC, 2022).

In light of the massive digitization process in Azerbaijan, the thesis is attempting to evaluate if the digital literacy level as well as the digital motivation of the Azerbaijani citizens meet the requirements to successfully implement and sustain digital projects. The thesis focuses on the regions outside the nation's capital city, Baku, since it is believed that the regions outside Baku have a lower level of digital literacy, thus, expanding the digital divide in the regions and causing an urban-rural divide.

Henceforth, the purpose of the research is threefold. Firstly, the thesis is looking for producing a comparative picture of the digital divide index of citizens across various population categories. Secondly, considering the divide differences in the subject population groups according to the place of residence, the thesis will attempt to identify the protruding factors related to the digital divide. The final purpose of the thesis is an underlying aim to contribute to the pool of existing literature on the digital divide from the perspective of public administration and observe the phenomenon of the digital divide issue in Azerbaijan at its early phase.

Since the theoretical basis of the thesis is founded on the theories of digitalization by the conceptualization of the framework, the thesis elaborates on the understanding of the digital divide at the public administration level in the base country. That being said, instead of general public opinion on determining the level of desired approach and solutions for the digital divide, the current thesis relies on the academic knowledge of the field for establishing desired policy patterns based on the digital motivation of citizens in certain criteria. By doing so the thesis demonstrate its ground to understand the digital divide patterns in rural Azerbaijan in its quest to suggest policy solutions for mitigating the drawbacks of technology development. The overarching assumption is despite the rapid digitization of public services, policy attention given to the digital divide is not reflective and there has been a mismatch between the capabilities of the rural population and the digital services offered to them.

Thus, the main research question of the thesis will seek answers for:

- **RQ1:** Does residence outside the capital city, Baku, affect the digital divide level in Azerbaijan?
- **RQ2:** Which social categories are mostly affected by the digital divide in Azerbaijan?
- **RQ3:** Does digital motivation significantly affect the digital divide?

Answering the research questions will illuminate the blind spots and offer suggestions for policymakers on what areas of digital literacy to prioritize in mitigation attempts. Seeking an answer to the second research question will assist the study in understanding the preferences of citizens in obtaining digital or physical public services and possible causes leading to their opinion based on their categorical divide. The third and final research question uses the beliefs in academia rather than popular thoughts to determine what segments of society are more motivated than others to utilize effective digital public service rendering in the case of Azerbaijan to mitigate the divide issues.

The first research will be essential to figure out the digital knowledge level in the regions. It may play an important role for public administration to decide on what is the best possible way to overcome the challenges arising from the digital divide. Moreover, it will contribute to the academic and administrative knowledge in this sphere, since there is not quite substantial research done on this topic in Azerbaijan. The research can find answers to fill knowledge gaps and alter

administrative approaches for the best fit. The study is important in below three aspects of discussion and suggestion:

- Figuring the digital divide rate in the regions
- Discuss the possibility and extent of digital transformation in the region
- Possibility of improvements based on prior local precedents and policy changes

This study is stimulated by the author's prior professional experience at the E-Gov Development Center in Azerbaijan and one of its projects to accelerate regional digital governance. Granting the increasing need for support to the regional citizens in dealing with the digitalization issues in the Azerbaijani public service sector, the necessity for knowledge on how the digital culture is being shaped in Azerbaijan has been increasing too. Hence, the academic research on the related phenomenon will also contribute to evidence-based policymaking in the subject country. Through the analysis of general digital and administrative knowledge in Azerbaijan, the current study adds up to the pool of research both on the digital divide and public administration. To the researcher's knowledge, an identical study has not yet been done in Azerbaijan in terms of quantitative analysis of digital literacy among the regional population which will adequately address the mitigation efforts of the digital divide at the administrative level. While the current thesis takes into consideration the digital divide issues in Azerbaijan, it can also be helpful for the researchers and practitioners alike in the neighboring countries, Caucasus, and post-Soviet region.

d. Structure of the Thesis

The structure of the thesis consists of six chapters. *The first chapter* presents an introduction by giving a background introduction about the discipline and the country context as well as defining the purpose of the research. *The second chapter* outlines the theoretical underpinnings relevant to the research and the final sub-section establishes the conceptual framework used in the current study based on the prior literature review in academia of the digital public services domain. The following *third chapter*, explains the methodology employed in the research and its effectiveness in the academic field as well as the drawbacks and shortcomings that are unavoidable. The third chapter also explains the data collection procedure of the study and the methods and tools employed during the data analysis.

The findings of the research are presented in *the fourth chapter*. It is organized in a way to locate necessary information in a convenient way for the readers by dividing each of the findings under a new header followed by the statistical analysis and tables of the analysis results. The findings are presented in the sub-section headed by the title responding to the research questions. The thesis is generally summed up in *the fifth chapter* of the thesis under the conclusion where the summary of the thesis, and policy recommendations are presented in the same chapter relevant to the policy domain of Azerbaijan.

The Abstract in English, Table of Contents, Table of Figures, and Abbreviations are included after the title page. References used for the writing are presented after the fifth chapter. Appendices can be found after the list of references while the locator for the appendices has been organized in the table of contents. Abstracts in Korean, and Azerbaijani have been organized after the Appendices. The thesis is concluded by acknowledging the people whose support are highly appreciated. References, Abstracts in three languages, Acknowledgements, and the Appendices comprise *the sixth chapter* of the thesis. The survey questionnaire for data collection and the model used for evaluation of responses have been presented in the Appendices section.

Chapter 2. Key Concepts and Theoretical Underpinnings – 7 Digits

This section attempts to introduce and explain key concepts dominating the heart of the study by enlightening the academic references to technical topics related to the digital divide. Overall, it consists of seven major digital concepts each bearing importance to better understanding the thesis purpose since they are the overarching themes of the study. The first six main digital issues or technical references are discussed reflecting the thoughts on academia in each topic while linking them to the purpose of the study. Various academic thoughts and viewpoints are presented in order to compare differences in academia and present the evolution cycle of each concept. Most importantly, this section clarifies ambiguous digital terms by reflecting on them and explaining the differences in detail. It is followed by discussions on the digital divide and its concept that will be used for establishing the conceptual framework of the thesis in combination with the previous six topics. The author of the study believes that the elaborations of this section will anchor the understanding of the digital divide within the frameworks of this study and provide assistance in guiding the analysis in the following section.

a. Digitalization and (or) Digitization?

The thesis motive stems from the notion of developments in computer sciences, to be precise, technology, in conjunction with an efficient organizational integration – application and treatment of digital technologies in the public sector which is frequently mentioned as digitalization in policy reports. Considering that the term lays the cornerstone of the thesis' main topic, there is a need to define the term in one way or another. Even though digitalization is broadly studied by the academic community and widely explained in policy reviews, the term itself has been rarely defined in either sphere.

To better understand the notion of digitalization, one needs to distinguish it from digitization. Gartner's IT Glossary refers to digitization as "a process of changing from analog to digital form, also known as digital enablement" (Gartner, 2022). Changing hand-filled application forms to online forms which are filled on an organizational website and transferred directly into a database can also be called digitization. Hence, the best description for digitization would be encoding the

traditional written form of information into zeros and ones, which are measured by bytes in contrast to pages, to make it possible to be read, processed, and transmitted by computers. Digitization lays the foundation of digitalization and significantly reduces the margin of errors in its implementation sphere. What does not apply to the domain of digitization in the public sector is changing the public service delivery, which belongs to the realm of digitalization.

Regarding digitalization in the public sector, it is mostly about the observations of ways public administration liaises and involves other societal actors namely professionals, enterprises, and citizens in restructuring the public service delivery processes (Clarke & Craft, 2019). For instance, establishing a nationwide database system in a desirable public sector, let it be the education or defense sectors, equally means bringing other agents into collaboration and integrating them for diverse purposes. The foundation of digitalization is the digitized data that can be utilized for bringing change and transforming the ways public services are delivered or public section functions. In short, when the computer-processed digitized data is used for predictive and preventive purposes, optimization, or quality improvement of products, it becomes digitalization (Gobble, 2018). Therefore, one can digitize the information, but not the process of altering established systems. A huge quantity of digitalization literature in academia focuses remarkably on technological innovations and reveals the transformative implications of digitalization. Usually, the technical terms of digitalization and digital transformation are used interchangeably as synonymous (Henriette, Feki, & Boughzala, 2015).

The agents taking part in the digitalization process may range from local governments and central governments to the authority which undertakes the digitization. Since the process of digital transformation involves various actors, it is relatively easier for individual actors to jeopardize or not conform to deep-seated transformations if policy designers do not oversee proper coping mechanisms (Margetts & Naumann, 2017). The effects of human agents' arbitration between organizations and applications of technologies have recently gained much attention, although the technological influences on organizations have long been under the strict scrutiny of scholarly articles (Rogge, Agasisti, & Witte, 2017; Kallinikos, Hasselbladh, & Marton, 2013).

Digitalization poses interdependencies for public institutions within intra and inter-organizational levels. These posits necessitate policy strategies in order to determine the trajectory for the application of technologies (Kallinikos, Hasselbladh, & Marton, 2013). The scholars analyzing the

success and failure stories of digitalization chiefly emphasized the imperative role of human agents, hereby outlining the connotation of *political commitment* and *embeddedness*, which are commonly accepted as governance structure and execution plans (Vries, Bekkers, & Tummers, 2015; Breznitz, 2007). Political commitment denotes the importance of a given digital policy for an elected official or various interest groups (Breznitz, 2007). The other term, embeddedness, emphasizes formal relations among the policy actors and denotes confidence and cooperation mechanisms within a set of relationships (Uzzi, 1999). In the case of digitalization, features of a project determine the mechanisms of political commitment and embeddedness as such political commitment seems to come forth when intra-organizational dependencies are strong. In opposition to this notion, inter-organizational collaboration features the importance of embeddedness (Giulio & Vecchi, 2021).

Digitalization of every aspect of society raises societal and ethical issues alike since it pushes the limits of people's capabilities and changes moral values for good. For instance, one of the digital technologies, IoT helps expand and improve profiling systems, which contributes to the operational ability of the security field by identifying and tracking potential criminals and fraudsters. From the perspective of security and service rendering, this might be treated as customization and efficiency, but it also puts people belonging to a certain group at risk, especially those who are structurally underprivileged. Several scholarly types of research also warn against the drawbacks of automated systems and robotics and indicate possible discrimination and exclusion from society (Citron & Pasquale, 2014; Zarsky, 2013). A study revealed that Google advertisements customize more senior job positions for men than women, which showcases potential flaws of digitalization (Datta, Tschantz, & Datta, 2015). Although data variables regarding race and religion are not usually included in databases of the public sector, predictions show that similar discriminations may occur in the public domain due to the multiplication of face recognition (Hildebrandt, 2012). In general, it is clear that digitalization is not only about the advances in devices only, but they have an immense impact on our public values. Existing public regulations are not sufficient to control the shortcomings of digitalization concerning social and ethical issues since the policy-makers do not have comprehensive knowledge of its implications (Royackers, Timmer, Kool, & Est, 2018).

b. Digital Public Services and Innovation

The general terms of Digital Public Services (hereafter DPS) refer to available online processes by the government. The European Commission describes DPS as “the use of technology to provide services to citizens at local, regional and national levels” (European Commission, Digital public services and environments, 2022). In other words, any online operation that puts citizens and the government in contact can be considered a digital public service. Accordingly, digital public services may refer to filling out civil affair forms to apply for a passport, marriage registration, utility payments, and business-related services such as business registration not to mention retrieving public records. However, the level and the extent of DPS vary from country to country and even within the country itself.

The glitches of traditional government, with its nature deeply rooted in bureaucracy, are usually an obstacle to ensuring accountability and incentives for citizens to operate traditional public service delivery smoothly, especially in developing nations. Overcoming such glitches necessitates public service delivery to be fused with technological innovations and establishes cooperation among the triangle of government, business, and citizens. In often cases, non-government organizations act in accord with academic institutions to check and balance the developments in DPS. Principally, the argument of society’s rapid change lays the foundation for the government’s need to adopt new technologies to keep up with the citizens’ demands and shifting social settings (Meijer & Thaens, 2021).

Digitizing public service delivery equally means analyzing the local requirements of citizens and adapting them to local expectations via digital tools (OECD, 2015). To achieve the same end, governments adopt different innovation methods at their disposal including transparent and participatory modes (Rose, Persson, Heeager, & Irani, 2014). Consequently, given the fact that governments attempt to provide digital public services as part of their overall digitalization agenda, each digital service is analyzed, designed, and prompted individually.

The necessity for the provision of digital public services arose from the mounting income inequality with an expectation to ensure the permanency of essential public services disregarding the income levels of citizens (Bertot, Estevez, & Janowski, 2016). However, public service provision in its turn faces challenges from the aged population, illiterate segments of society both digitally and socially as well as the lack of motivation for preference over the traditional public

service delivery. Ensuing the digitization of public services, new concerns such as quality and sustainability of the service provision became a hot topic in addition to the collective accessibility.

The quality of DPS is measured by eGovernment maturity models to which there are no universally accepted standards as in other fields of digitalization. United Nations Global e-Government Survey's four-stage maturity model used to be accepted as a "standard" since its formation in 2001, but innovations are non-linear and they continue to evolve despite a constant change in definition. (Bertot, Estevez, & Janowski, 2016). Therefore, apart from meta-models developed after 2005, as many as 11 maturity models have been identified as of 2020 (Kawashita, Baptista, & Soares, 2020).

Although the government of Azerbaijan does not have a systematic Digital Government Evolution Model, it has a system for evaluating digital services that are carried out by ASAN Service. The evaluation of eServices is divided into three criteria by ASAN: level of digitalization and relevance; level of information openness and accessibility; level of convenience of use. Each of these criteria is divided into several sub-criteria in their order and they are evaluated by digitalization experts with 0, 1, and 2 points. Based on the final scores, eServices of public agencies are remarked as non-satisfactory, satisfactory, good, and excellent. The guidance for the evaluation has been prepared based on the recommendations of the European Union, UN, and other relevant international practices (Alguliyev, Yusifov, & Gurbanli, 2018).

Compared with private and non-profit sectors, innovation and digitization in the field of public service are different. The public sector is usually repulsive to change since its nature is bureaucratic and prefers an incremental approach for implementing innovations in delivering public services as well as its rigid structure of the administrative set of frameworks. Nevertheless, it does not mean that the implementation of innovations in the public sector is impossible but they are forced to follow different paths as one would anticipate. To better understand the evolution of public service delivery, one must consider economic, political, and social pressures on the government (Bertot, Estevez, & Janowski, 2016).

There is a perception of the "innovation imperative" in public service delivery among society and practitioners alike. However, academics should be aware of the "perverse effects" due to the possibility that innovations may yield opposite to what was initially intended. They are not caused only by the original logic in innovation implementation, but also influenced by how it is managed

and implemented with the politics of a government. The perverse effects can be *lack of stability* caused by incessant public service innovations; increased *illegal practices* caused by breaches in established rules; *corruption* due to freedom of individuals; *waste of public money* since most of the cases innovations fail; *absence of democratic control* because of unapproved implementation of innovation due to perceived “always right” approach; *damage to local initiatives* considering innovations imply one nationwide approach disregarding local practices; *disruption of a power balance* by trusting powers in the hands of an already powerful; *undesirability* meaning that service innovations may cause inconvenience to the stakeholders; *the technocratic dominance* in public processes on the grounds that politicians may lack the knowledge on how to judge or regulate a specific technology; final perverse effect is *unforeseen security* risks as cyber threats grow in parallel to innovation in service delivery and put sensitive information of citizens under risk (Meijer & Thaens, 2021).

Digital Public Service delivery goes through constant development to meet the expectations and demands of digital technologies while government institutions face challenges to bring expectations into reality by unleashing the full potential of technologies. Transparency, efficiency, cost-saving, and openness are only a few benefits of effective digital public service. If it is kept under check and free from risks, DPS may afford convenience to citizens and businesses alike.

c. Digital Government versus eGovernment

Academic and policy literature usually use the terms eGovernment and Digital Government interchangeably. This approach, however, is inherently erroneous and may lead to confusion although there is a certain amount of similarity in the context of both terms. Understanding the difference between digitization and digitalization may serve as a background and therefore should be treated as a prerequisite for contemplating the notions of eGovernment and Digital Government separately without intervening in each other’s connotation domains. During the emergence and early use of both terms, no strict distinctions were made among them. Nonetheless, Organization for Economic Co-operation and Development (hereafter, OECD) published the Recommendation of the Council on Digital Government Strategies in 2014 which clarified and made further characterizations in the domains of each technical term. Only then, academic literature commences explaining the domains of each term separately and giving necessary attention to the functionalities of the terms.

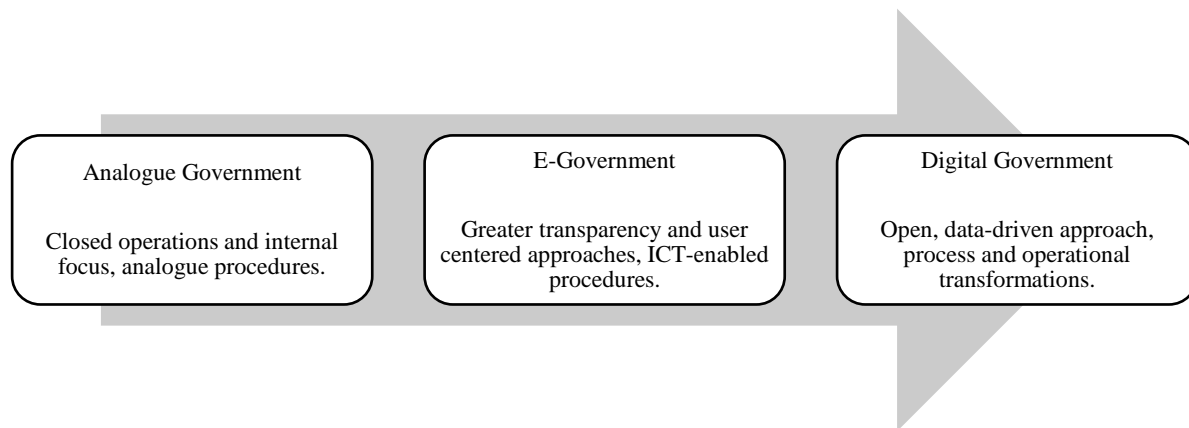
OECD Recommendation describes eGovernment as “use by the governments of information and communication technologies (ICTs), and particularly the Internet, as a tool to achieve better government” (OECD, 2014). Deriving from the reference, we may state that eGovernment is mostly about providing citizens with information through ICT. Hence, eGovernment involves coding, storing, and flow of official information in a linear fashion which can also be described as a “one-way-communication” (Postman, 2005). In this case, services can be provided on websites by central and local authorities as well as NGOs, and the interaction with the service providers is limited to downloading and filling official forms, receiving information and announcements, and transaction of payments (Sharma & Gupta, 2003).

Analyzing different policy papers for better defining the practice limits of eGovernment makes it clear that a common theme is enhancing public service delivery to citizens, businesses, and related public agencies through the use of ICT (Palvia & Sharma, 2007). Therefore, eGovernment can be understood as a starting point for establishing comprehensive digital governance by creating static public web pages to provide citizens with convenient access to public services and information. Describing the same statement with technical terms, eGovernment is an instrument encompassing three dimensions of technology: infrastructure, solutions, and the establishment of public portals.

Taking everything into consideration, it is crucial to identify the period when the term, digitalization started to enter the academic and political lexicon for comprehending the distinct line between eGovernment and Digital Government as well as their comparison. Janowski (2015) theorizes that Digital Government started to evolve from eGovernment through the invention of Government 2.0 in the 2000s and took the current shape of digital by default approach (in mid-2010s) by becoming a more integrated conjointly transaction-oriented form of eGovernment as well as being capable of augmented technological and structural complexity. Coleman (2008) outlines four distinct characteristics to define Digital government: first, traditional political institutions and hierarchy yield their power to a network state; Second, lack of information and cooperation is replaced by joint data collection, exchanging, and borrowing among public institutions leading to the abundance of data; Third, transitioning from one-way-communication to interactive mode of public service provision where citizens can obtain their data rather than addressing an online letter asking for the service; Lastly, digitalization change the institutional behavior including structural changes and its human action.

Janowski’s theory is the closest description to the recommendation of OECD which elaborates on the evolution of public services through the use of ICT. It emphasizes the rise of eGovernment through the increased ICT applications in the public sphere and its takeover of what was conversely known as the analog approach. According to OECD, eGovernment is mostly about generating, sharing, and processing citizen and business data among the public administrators only for internal purposes to modernize public services whereas linking stakeholders to the process and implementing open, data-driven, and risk-management approaches are prerequisites for the digital government (OECD, 2021). It further elaborates that transformation from eGovernment to Digital Government occurs when the public administration initiates increased use of digital tools and data in their internal operations (Figure 1).

Figure 1: Transformation of the Public Sector



Data Source: Based on OECD Recommendation of the Council on Digital Government Strategies 2014

Considering all the above, there are three major variables to determine if a government has completed the transformation from eGovernment to Digital Government. First, digitization should transform the internal operations and structures rather than adding up to them without any impact. Second, applied technologies should redesign the relationship between the public sector and its beneficiaries, if it is exclusive to internal operations, digitalization is not evolved yet. Finally, transformation should be context-specific to address a country or public institution (Janowski, 2015) (Figure 1). Janowski’s three variables align with the OECD definition of digital government: “the use of digital technologies, as an integrated part of governments’ modernization strategies, to create public value. It relies on a digital government ecosystem comprised of government actors, non-governmental organizations, businesses, citizens’ associations, and individuals which

supports the production of and access to data, services, and content through interactions with the government (OECD, 2014).

By and large, maturity models may come in handy to observe the transition of governments from eGovernment to Digital Government. Maturity models are the description of a set of stages to measure the capability of public services to meet the standards of stated goals and targets, meanwhile facilitating domestic and international benchmarking for the evolution of digital transformation (Kawashita, Baptista, & Soares, 2020). Although United Nations Global e-Government Survey's maturity model was accepted as a standard form of measuring eGovernment since 2001, it was passive to rapid changes in eGovernment and fell out of use (Bertot, Estevez, & Janowski, 2016). As of August 2019, the most cited maturity model is the Layne and Lee model (Kawashita, Baptista, & Soares, 2020). It is comprised of four stages of eGovernment evolution and is based on US initiatives. The first stage of the model oversees the appearance of an institution on the World Wide Web (catalog), followed by granting an option for citizens to make transactions on the web page (transaction), third stage is the vertical integration where comparable functionalities and dominions of the system is integrated with a higher-level system and lastly it is transformed into a one-stop-shop via integration with different actors and rendering a platform service (Fath-Allah, Cheikhi, Al-Qutaish, & Idri, 2014). Despite being the most popular maturity model, it is argued to be biased by governments and international organizations to deceptively endorse or showcase eGovernment transformation (Andersen & Henriksen, 2006).

Digital Government Evolution Model, however, does not concentrate on the stage of growth but captures digitalization maturity at the macro level rather than the micro-level which allows the evolution of various stages at the same period and letting initial stages endure for research and innovation as well as demonstrating the roots, instruments, and consequences of the following stages (Janowski, 2015). Janowski's Digital Government Evolution Model is based on the three variables described earlier in this section (internal government transformation, transformation affects external relationships, and transformation is context-specific) and four stages of digital evolution (digitization, transformation, engagement, and contextualization). The presence of each of the variables (answered by yes or no) determines the stage of digital government in a given government or institution (Table 2).

Table 2: Digital Government Evolution Model

No	Stage	Variables		
		Internal Government Transformation	Transformation Affects External Relationships	Transformation is Context-specific
1	Digitization (Technology in Government)	no	no	no
2	Transformation (Electronic Government)	yes	no	no
3	Engagement (Electronic Governance)	yes	yes	no
4	Contextualization (Policy-Driven Electronic Governance)	yes	yes	yes

Data Source: Based on Janowski’s Digital Government Evolution Model from Digital government evolution: From transformation to contextualization (2015)

d. Digital Literacy

Although many authors had already suggested ideas and used the phrase “digital literacy before, Paul Gilster published a book in 1997 explaining the concepts of digital literacy, hence coining the term in academia (Gilster, 1997). Contradicting the commentators before himself, he contended that digital literacy is about mastering the ideas of technology not barely knowing how to use computer keys. However, the concept of digital literacy has undergone a massive transformation since publishing the book and includes a broader list of digital skills, attitudes, and competencies for a person to be qualified as a digitally literate. Gilster interpreted and argued that it means being literate in the digital age and referred to as an ability to operate on digital sources such as browsing the internet. This concept laid the foundation of today’s conventional digital literacy argument which is based on the ability to read and write using modern technologies. As it may seem a vague argument, it is the strength of the author’s concept since the list of generic skills to be qualified as digitally literate is hard to establish let alone be accepted universally. Gilster’s basic notion of the ability to read and write via digital technologies, however, is the basic quarrel of any digital skills that are required.

European Commission includes digital literacy in its Recommendation on Key Competences for Lifelong learning and defines it as a necessary skill for obtaining digital competence to use it for leisure and professional activities confidently (European Commission, 2020). This definition refers to the basic understanding of digital literacy and the ability to survive in the digital age.

EU's common objective is to equip all levels of society with at least basic digital skills to keep them in the competitive labor market. Most digital literacy experts, however, do not agree with this approach and suggest a broader understanding and implementation of digital literacy issues.

Martin and Grudziecki (2006) established levels of digital literacy to showcase the development phases and evaluate digital literacy in a given situation. The formula Martin and Grudziecki suggest is comprised of three closely linked levels and describes the relation and transformation to the next level. At the base level, lays digital skills, attitudes, approaches, and concepts categorized as digital competencies. Level two is the professional and disciplinary usage of digital tools completely dependent on the previous level and impossible to achieve without it. This level also signals one's ability to process and comprehend digital issues independently and find solutions to problems using digital tools per se. At the proceeding level, individuals are required to create new innovative content using the information collected online and be capable of transmitting the new content utilizing the very same digital tools. By achieving the third and final stage, the authors believe to achieve digital transformation in terms of the literacy aspect.

According to Tabusum (2014), being digitally literate equally means being capable of tracing, establishing, comprehending, evaluating, and investigating the data. He argues that the ability to transmit information created by digital tools is more decisive than simply being capable of computer literate. This study was not left alone with its ideas since Walton (2016) shared the same requirements as a must for being considered a digitally literate. The paper claims that basic skills to operate on the internet are not enough and individuals should possess skills to critically and confidently analyze content for professional and academic purposes. Both papers' claims are identical in their demand for comprehensive knowledge of various digital formats and operating tasks successfully in a digital environment.

The disposition of digital literacy across age groups differs in the sense that they possess dissimilar abilities in various literacy categories. A study analyzing the capabilities of travel website users found that young participants are superior in dealing with visual tasks such as graphic instruction whereas older participants proved to be better in text processing related tasks (Alkali & Amichai-Hamburger, 2004). The findings of the study prove that digital literacy is closely tied with general literacy and education level which should be endorsed during the early years of school education. Without being capacitated with quality and creative text reproduction skills, the younger

generation is unlikely to excel in the digital literacy level despite their advantage of being digitally native and having high digital skills. The issue of reduced information literacy level among the younger segment of the population makes them vulnerable to prejudiced or dishonest information which should alarm the related professionals to tackle the subject.

Putting digital literacy aside, the notion of literacy, which is under development in parallel with human history, has not been universally accepted yet. However, a UNESCO report defined literacy as an individual's ability to read and write basic statements in a short form for communication purposes for day-to-day processes (UNESCO, 2008). Overall, literacy is understood as a potential for empowerment and the ability to communicate and contact in a written form. This understanding is the major definition of literacy with anticipation of interaction between individuals (Keefe & Copeland, 2011). Guided by these notions and putting all the technicalities aside, this thesis understands digital literacy in a context to possess the necessary basic skills to:

- Operate on a word-processing document such as MS Word;
- Be able to fill online forms and create a profile in a digital environment to launch a digital presence;
- Receive, transmit, and communicate information digitally.

e. Digital Skills

When digital skills are concerned scholars merely refer to the internet operation skills which are sometimes referred to as button knowledge. That being said, almost the entirety of modern academia has a consensus that the concept of digital skills is more intricate and includes both basic skills and comprehensive knowledge of using digital content (Ferrari, 2012). At the same time, the concept of digital skills is the cornerstone of digital literacy since the quality and quantity of digital skills are the main determinants of measuring an individual's digital literacy level. However, it is worth paying separate attention to it considering how broad the concept of digital skills is itself.

Several academic proposals break down digital skills into separate definite skills, however, most of them focus their attention on general skills of information browsing using digital tools and related technical features. Recently, several scholars advocate for the inclusion of socio-emotional and communication skills into the concepts of digital skills (Calvani, Fini, Ranieri, & Picci, 2012).

Furthermore, the skills of creativity in a digital environment and content creation are becoming inseparable parts of digital skills (Ferrari, 2012). It might be true that there is enough space for medium digitally skilled individuals in cyberspace, but this does not ensure the stability of the development of these individuals for content creation (Deursen & Dijk, 2010).

Overall, digital skills can be considered a digital competence altogether and may include solution finding, content creation, ability to defend against cyber threats, communication as well as information collection skills. One of the most important skills among all is content creation which is often considered the artery of operation in a digital environment. As the computers and digital environment evolve, more and more digital formats enter the vocabulary of digital users and it is imperative to keep up to date with the developments and obtain necessary content creation skills to be able to produce content in different formats required by various platforms.

Individuals have different resources to attain digital skills over time. A study conducted in the Netherlands outlined three possible categories to determine where individuals may obtain their digital skills (Deursen & Dijk, The digital divide shifts to differences in usage, 2014). The group called the independents are skill learners through a trial-and-error approach without any serious assistance although they may refer to the tutorials on websites or DVDs. The segments of the population belonging to the independent way of digital skill learners are usually young, males, and highly educated individuals. The next group is called the informally assisted which mainly comprises the elderly, females, and insufficiently educated. They are capable of using digital tools but may ask for assistance from friends and colleagues when facing challenges in the digital environment. Lastly, formal assistance seekers are comprised of old and employed individuals with insufficient or medium education who regularly enroll in digital courses to increase their skills. Enrollment in the case of the last group can be demanded by their employers or on their initiative.

The research concludes that the segment acquiring the most cutting-edge knowledge is the one called the independents. Informally assisted individuals may develop their digital skill capacity within a period, but in most cases, they lack strategic skills and are largely incapable of information browsing skills. The methods they rely on are not sustainable since friends and relatives are usually reluctant to provide an extended explanation, therefore, knowledge gained through informal assistance is partial and sometimes false. Since formal assistance seekers get educated in strategic

digital skills from professionals in the field, informally assisted individuals to find themselves in the worst desired condition. The formal assistance seekers gain stimulating effects and status from the training which motivate them to augment their digital skills. Furthermore, making digital tools part of their daily life contribute to the cause by making it a lifestyle that is often called cultural resources.

f. Digital Divide

The main disadvantage of any Digital Divide research is the lack of a widely accepted conceptual definition of what the “Divide” refers to. The term, Digital Divide, started to be widely used by the scientific community after an official publication by the US Department of Commerce’s National Telecommunications and Information Administration (NTIA, 1999). In a broader term, Digital Divide refers to the knowledge or socio-economic gap between those having and not having access to the novel methods of information technology (Dijk J. A., 2006). Although in the mid and late 1990s digital divide was loosely expressed to define the disparity between people having internet access and those without internet access (haves and have nots), starting from the 2000s, the term became more accurate in terms of what we intend today (Srinuan & Bohlin, 2011). If we agree to consider the research of the digital divide as an equality investigation, according to economist Amartya Sen, first, we need to ask the question: “Equality of what?” (Sen, 1992). In this case, we come up with the question: “What does the digital divide concept intend to refer to?”.

Without hesitation computers and the internet are inseparable parts of modern life and the people standing on the opposite side of those two chief components face major drawbacks in the labor market or even social life. Government documents may demonstrate an increased level of web penetration in a given country. Despite that, the remaining non-user population usually belongs to the same segment of social life with a similar background. In other words, even if a country does a good job in growing digital access, it might be due to the privileged population at the expense of the ones with fewer opportunities. In this fashion, the digital divide can be related to gender, income level, place of residence (urban vs rural; or even among different neighborhoods of a city; etc), age, health, education, race, etc., as well as material access such as access to internet and ownership of various kinds of electronic devices.

Among all the population categories, the age-related digital divide is prominent in almost all societies. Consequently, the age groups referred to as “Digital Natives” and “Digital Immigrants” (people born after and before 1980) have diverse likings and approaches to internet usage (Chaiklin, 2010). For an instance in a Pew Research Center Survey, 84% of American adults aged 18-29 responded that they regularly use social media, compared to 73% of 50-64 years old and 45% of 65 years and older, which proves that the older the generation, lesser they prefer social media usage (Perrin & Anderson, 2019). The older adults also report lower confidence in their ability to use the internet as well as lower efficacy for technology use (Ammann, Vandelanotte, Vries, & Mummery, 2013). Concerning the case, 41% of adults aged between 50 and 64 indicated that they are confident in using electronic devices while the numbers demonstrate 74% of confidence among Americans aged 18-29 (Anderson & Perrin, 2017).

The issue of the Digital Divide gained momentum in 2000-2004 when a series of international and local conferences were dedicated to overcoming the existing divide. By 2005, the attention given to the issue started to decline on the policy level as most of the politicians from developed countries announced that the main portion of their population gained internet and material access, therefore, the issue has been solved. However, in the scientific world more terms such as “redefining the digital divide” and “beyond access” were appearing to address the issues of the non-material related digital divide (Dijk J. A., 2006).

After extensive research since 2002, the term emerged more about social, psychological, and cultural backgrounds than physical access such as personal computers and having the internet at one’s disposal (Dijk J. A., 2006). However, a general idea of material access persisted in the first decade of the 21st century when 143 published literature were reviewed on the digital divide issue whose 73.3% examined material access (access to computer/internet/broadband) and 17.9% discussed the ICT index whereas further 4.1%, that is to say only 8 articles, looked into combined use of mobile telephony and ICT (Srinuan & Bohlin, 2011).

There is a misconception by the general population that the digital divide can be closed once and for all. In reality, the digital divide is very hard to catch up with. In this sense, the citizens of developing countries are at a great disadvantage. By the time their governments catch up with a new form of information technology, the knowledge in that sphere has probably been advanced already.

The most prominent issue of the Digital Divide is its perception of an endless process rather than a static target. It is a technology appropriation, which according to Jan A.G.M. van Dijk's ideal scheme, it brings new technology and the entire process starts all over again when the previous process is finished. At the bottom of the scheme stands motivational access which stipulates that a person should have a wish to own a computer and have an internet connection. Factors that affect digital motivation include the belief in usage opportunities, time, perception of the internet as good or evil, financial status, and skills. Motivational access is preceded by material access which is the application of motivation in physical form that is to say owning a personal computer and subscribing to an internet connection. The real challenge of the Digital Divide nowadays starts from this point, where digitally adapted people need the skill access which is also referred to as "digital literacy" or "computer literacy". To succeed in digital literacy, digitally adapted people are required to have basic skills or "instrumental skills" to work with hardware and software. Advance skills access consists of "information skills" – a set of capabilities to search, and process information in electronic devices; and "strategic skills" – the capacities for utilizing electronic devices for the sake of general goals to progress societal positions. Usage access is the final stage for completing the technology appropriation. It is defined as measuring one's usage criteria to assess if they involve sufficiently in the digital world. The criteria for the usage access are divided into usage time; applications and their diversity; broadband or narrowband use; preference for active or creative usage (Dijk J. A., 2006).

g. Digital Exclusion

Digital exclusion is understood as an access and capacity inequality for benefitting from the information and communication technologies which may be an essential demand for taking part in societal actions. Since the introduction of ICT into public life, digital exclusion started to spread on uneven patterns and persist in the same patterns. Schejter et al (2015) present that there is a strong correlation between persistent social inequalities and access to the internet, besides emphasizing the need for finding solutions to the issue to ensure citizens' full integration into the digital world.

Social exclusion itself does not solely originate from economic and financial disadvantages, but in most cases, it can be due to geographical location, cultural identity, age, and general health (Burchardt, Grand, & Piachaud, 2002). Hence, we may conclude that exclusion can derive from

voluntary factors as much as it can be due to involuntary factors, and in an extensive view, it stems from being underprivileged or segregated. However, standard definitions and measurements of social exclusion consider the financial situation, education level, and professional occupation as variables to consider the social exclusion. Dubiously, the standard form of measuring social exclusion was mirrored in the measurements for digital exclusion by referencing only the lack of financial means to be barred from the use of ICT. While identifying the causes of digital exclusion, it is imperative to distinguish one out of four core reasons for exclusion: access, skills, attitudes, and types of engagement (Dijk J. A., 2005).

Digital exclusion as a technical term is very close to the digital divide. In fact, it is the digital exclusion that conveys the digital divide into existence. The concepts of digital exclusion have undergone several adaptations over the years. At its emergence phase, it was comprised of basic necessity for individual communication, its intermediate definition meant the use for individual networking and civic participation at its most advanced use (Helsper E. J., 2008). These definition does not solely involve material inaccessibility but also the lack of digital literacy. The study frameworks that the reason for participating or not participating in the digital world is due to several factors involving social, material, psychological, and negative perceptions of the use of the internet. A considerable number of respondents of various studies enunciated their skepticism due to older age, distrust for modern technologies, and a wide range of unsuccessful experiences on the internet (Deursen & Helsper, 2015). Other contributing factors for non-internet users in older age categories were the low level of digital literacy and traditional literacy as well as gender and family composition. It was also interesting to see that a remarkable number of female non-users usually have internet access at home but are not interested in benefitting from it since their perception dictates that contemporary technologies are more suitable for men and are a masculine field. Excluding highly educated individuals, people over 75 years of age strongly believe that they are too old to be engaged in the internet. Highly educated adults belonging to the same age category, on the other hand, stated that they do not have available time for the internet.

Apart from raising the issues of material internet access and the effects of social discrimination, academic literature in the field of digital exclusion involves the culture of using the internet, attitudes towards it, and the ability to get benefits from digital tools. Academic literature aside, various organizations define the approach toward digital exclusion differently. It is defined as

every individual's right by several definitions while the other definitions recognize it as an opportunity for citizens to raise their education and participatory level. The Scottish Government announced its digital program in 2014 which is called the Digital Participation: A National Framework for Local Action admits the profits of internet usage for the educational, medical, and social needs as well as recognizing the possibilities of integrating people with certain disabilities issues into the society (Scottish Government, 2014).

The thesis has already elaborated on the reasons and underlying causes of access, and skill exclusion in the previous sub-sections. Digital attitude exclusion, however, goes far beyond digital skills and is mostly due to one's perceptions about the digital environment. The perception ranges from distrust of the internet to moral values in which case this is classified as voluntary exclusion. Although there is an urgent need for the classification of voluntary exclusions and their underlying reasons, still much is needed to be done in the field (Helsper E. J., 2012).

The digital exclusion does not only imply one's ability to connect to the internet but also the internet's bias toward a specific segment of society once they are online. The link between social exclusion and digital exclusion has been researched by many authors (Chen, Boase, & Wellman, 2002; Servon, 2002) who claim that the link leads to a rancorous sequence of persistence of social disparities in the digital world too. An article demonstrates the effects of discrimination caused by automation when automated software calculates the connection of affluent individuals based on the source of the call and possible occupation and prioritizes calls according to social status and leaves the less affluent ones at the end of the call queue (Graham, 2003). The tendency towards discrimination against people with social disparity will likely deepen as online service providers and tech giants gather more data on personal preferences, purchasing history, time spent online, and place of residence. Individuals connecting from the less wealthy neighborhood and less spending will likely get fewer benefits of the digital world.

h. Conceptual Framework of the Thesis

For conducting research analysis, a researcher is required to adopt a conceptual framework strategy from an existing pool of research or outline a new one per se. The current study utilizes a specific framework based on a theoretical review of the thesis and mainly digital divide scholar van Dijk's theories on the levels of the Digital Divide (Deursen & Dijk, 2019). The combination of the

aforementioned theories in this section and the three-leveled digital divide is the foundation of the research framework. This method permits the researcher to proceed with the research analysis with clear objectives on how to conceive and detect gaps between digital haves and have-nots. The figure at the end of this section is accommodating to make sense of the digital divide understood in the context of this thesis (Figure 2). For making the framework more comprehensive, van Dijk's earlier descriptions of access are included too although it does not occupy a central piece (Dijk J. A., 2005). Granting the fact that motivational access is not one of the three-leveled digital divides according to van Dijk, it is given prominent attention in this framework and van Dijk also recognizes it as a prerequisite for bridging the digital divide.

To conclude the causes of digital exclusion, the author integrates determinants of social background, digital access, digital literacy, and digital motivation which result in digital exclusion if determinants are partially or completely present. The author claims that the issue of the digital divide is almost impossible to adequately refer to if social stratification in terms of ICT usage is not considered in the disciplinary research. The analysis spares enough space to look into the perseverance of the divide in relation to educational level, place of residence, and age category. The importance of each of these factors (variables) is explained in detail in the data analysis section.

The thesis presents a conceptual framework that demonstrates a holistic method for the comprehension of the digital divide issue by trespassing conventional apprehension that considers it merely as a material or physical access as well as the capability to operate on a computer. However, the author conceptualizes the digital divide issue in the digital government and digital public service delivery while leaving the other fields of ICT outside the scope of the current study. The study contends that the divide takes its root from economic, and social conditions resulting in the lack of motivation and technical skills. This aspect in the conceptual framing stems from Epstein et al. study, which argues that the divide issue is either an access or skill challenge, and assists in a better understanding of the causes leading to the issue (Epstein, Nisbet, & Gillespie, 2011). Despite the abundance of the digital divide concept in academia, it is rare in the policy domain and almost impossible to be quality reasoning, which would not yield accommodating sources for the framework.

Having all the aforementioned facts in mind, the conceptual framework of the thesis for the final analysis is explained below and demonstrated in the figure at the end (Figure 2) along with the concept of the digital divide understood in this thesis for the statistics analysis (Figure 3):

The outer layer of the digital divide starts with an intention to carry on *social innovations* in the government which reflects itself in the form of a digitalization process to deliver public services efficiently and effectively. The first step towards the goal is the transformation from an analog documentation procedure to digitization that brings the practice of eGovernment. eGovernment itself does not mean complete achievement towards innovation process. However, after undergoing transactional services and greater use of ICT, the governments can render one-way digital public services. Transition to data-driven and operational restructuring permits the public administration to give an option for citizens on editing and apply for public services in a comprehensive (dual) manner. At this point, governments face the challenge of overcoming gaps that prevent certain categories of citizens from obtaining public services online due to various social and economic factors which are termed the digital divide in the academic and policy domain.

Levels of the digital divide comprise horizontal access issues in the framework and are divided into three levels. *The first-level digital divide* refers to both material and physical access as well as a dual divide. Physical access is understood for lacking electronic devices to connect internet (laptops, desktops, tablet computers, or mobile phones). Material access is a broader term that describes the economic situation of citizens to replace their existing devices with new versions, subscribe to software to maintain the availability of services, afford high-speed internet subscription, or even possess peripheral equipment such as printers and hard disks. Apart from material and physical access, some citizens may find themselves in a situation that is called the dual digital divide when they belong to underprivileged social classes (disability, gender, age, geographic location, etc.) in addition to the first level of the digital divide (Ferlander & Timms, 2006).

The second-level digital divide mainly refers to mastering technical skills to operate a computer and is subdivided into three categories: 1. Strategic skill is a general capacity of a person to use a computer or equivalent devices to anchor one's position in a society to achieve greater goals; 2. Information skill is understood as an ability to obtain information using digital tools, process it,

and be able to transmit it the same way it was obtained; 3. The final stage of the second-level digital divide refers to the instrumental ability for operating with hardware and software.

Usage of the internet (2nd level) is how citizens benefit from the internet which takes into account the time spent on the internet, the variety of applications used for surfing as well as a creative or pursuant form of user experiences. In a broader term, this may include the comparison of usage between work, career, educational purposes, and entertainment purposes such as online shopping, social media, or gaming. However, this division itself is dichotomous, since the use of social media, for example, can be both for professional and entertainment purposes. Overall, we may suggest that the third level of the digital divide refers to the contemporary use of the internet for various purposes (Deursen & Dijk, 2014) .

The third level of the digital divide involves far-reaching notions of digital literacy and briefly can be explained as one's ability to get outcomes from the usage of the internet or other forms of digital technology. In this sense, the digital outcome may refer to knowledge obtained by frequent use of technology such as getting familiar with technical terms in a digital field (public service terms in the case of the study), and benefitting from digital services.

Vertical categories of the framework's digital divide issues involve *social background*, first and foremost, which is the basic concept of an individual's social position such as education level, income, health, age, etc. *Digital access* refers to one's ability to obtain enough digital means (internet) and have the possession of digital devices which were earlier described as material and physical access tools. *Digital literacy* is probably the most far-reaching and broad category of the digital divide. It is mainly an individual's ability to reproduce digital materials using the knowledge obtained on digital platforms and transmitted through them. The digital literacy category is referred to as digital outcome by van Dijk and involves the final results of digital operations. Despite the fact that *digital motivation* is considered a prerequisite for bridging the digital divide it is fundamentally very difficult to measure since individuals' wills for the use of digital tools are different and hard to evince the fruitful form of use by academic terms. Perhaps, it was for the same reason that van Dijk refused to include it in the scopes of the digital divide. Notwithstanding, it is ultimately possible to make deductions on digital motivation when a study focuses on the digital divide issue in a specific field such as public service delivery.

Understanding the concept of the digital divide utilized in this thesis helps us build the conceptual framework for the analysis which is demonstrated in Figure 2. According to the conceptual framework of the analysis, what is referred to as the digital divide is the final product of the impact of place of residence on digital motivation along with other digital categories. It is ultimately affected by other social categories as well. In the case of the current study, the factors affecting the digital knowledge of citizens include their age, gender, linguistic capabilities, education level, and health conditions. However, all of these are understood as contributing aspect to the divide rather than the causal aspects. Therefore, the research will strive for cementing this argument.

Figure 2: Conceptual Framework of the Thesis

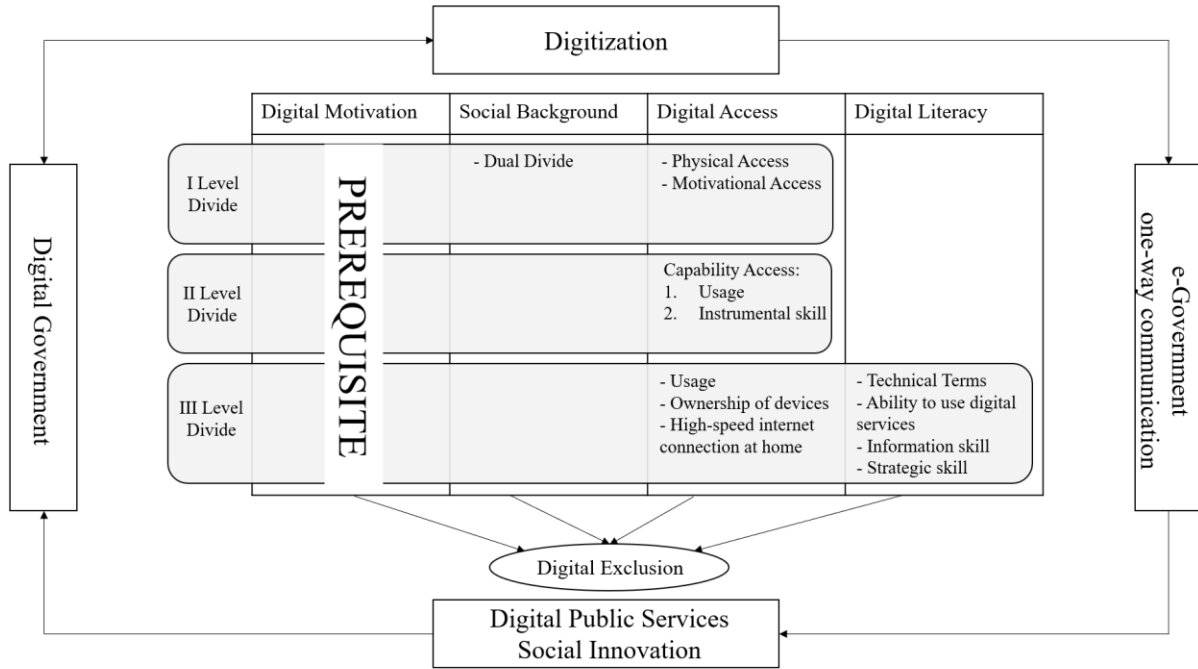
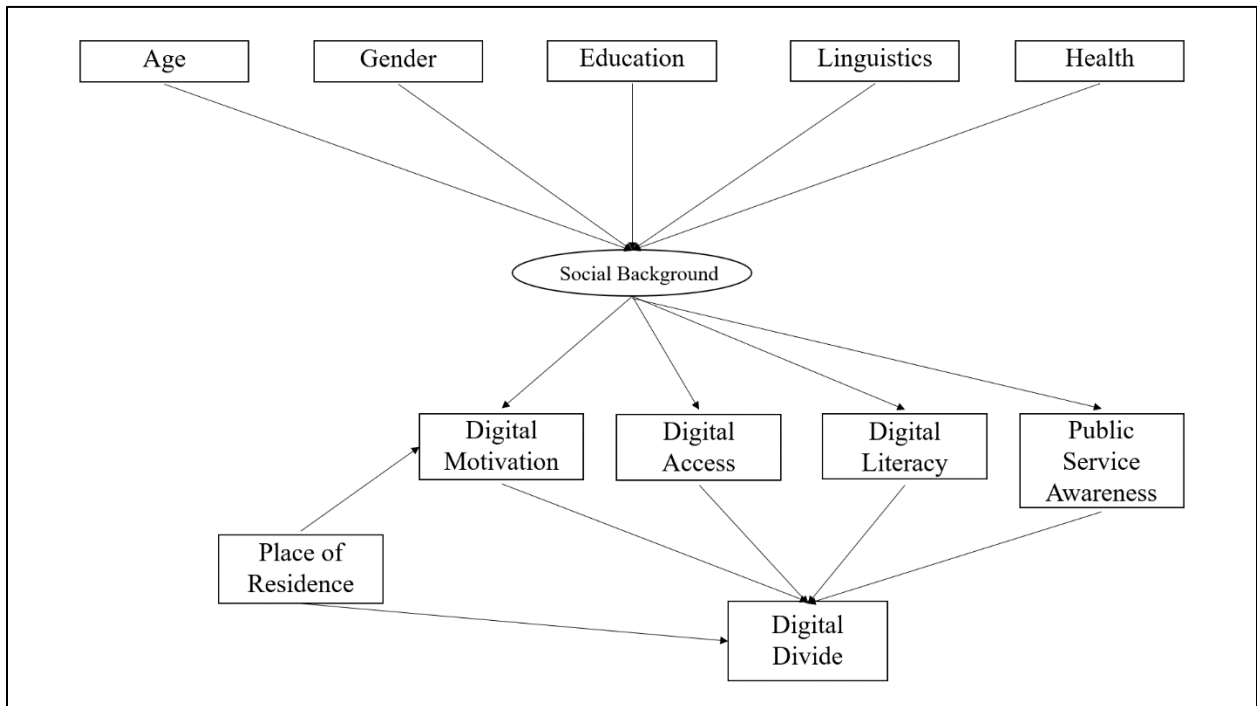


Figure 3: Conceptual Framework of the Analysis



Chapter 3. Methodology

a. Objectivity

The research was conducted in strict observation of ethical considerations and fully obliged to the Research Misconduct and Inappropriate Research Practices of the Seoul National University (SNU, 2022). Bearing research ethics in mind, it is imperative to disclose any connections or relations the researcher may have with the subjects of the research. In this sense, the professional connection between the researcher and one of the organizations responsible for the subject of the study has already been revealed in the sub-section of Purpose and Research Question, since the topic of the study is inspired by this connection. The researcher's employment status had been terminated during the course of the thesis writing and cannot be used as a ground for potential bias or pressure by the former employer. However, this may lead to more knowledge of a specific organization's activity over the others in the Republic of Azerbaijan which is not a requirement for the thesis per se and cannot be judged as a bias.

The data used in the study was collected for this purpose only and the respondents were informed about the purpose of the research and the educational institution the data is planned to be researched. The respondents were ensured about the safety of data storage and no intention for its commercial use in the future. The survey data has been stored in a manner not to be accessed by third parties but is not intended to be destroyed for protecting the integrity and future complications that may arise. Since the personal information of the respondents is irrelevant to the study, their identification responses have been anonymized during the data cleaning and metadata creation process. Furthermore, no information has been mentioned in the study which may lead to the identification of any respondent.

For eliminating the potential marginalization of survey respondents, the survey was conducted in the lingua franca and official language of the subject country. Later, the survey results were ethically translated into English while preserving the records in both languages. In an effort to reduce the possibility of ambiguous translation errors in the research data, univocal and plain language have been employed to be fit for academic integrity.

The main implication for the objectivity of this research is its sample size and representative manner of the population. Since research data requires the relevant number of samples, the

researcher used sample amount in accord with Andrew Fisher's formula. More information and details of the samples used in the study will be given in the data collection sub-section. Overall, the data has been collected in accord with the ratio of population size in the Azerbaijani regions and the country's general gender and age group indicators. The design of the questionnaire is satisfactory to draw conclusions on the motivational digital divide in the surveyed cities. Only clear and definite responses to the survey questions are included in order to reduce the risk of ambiguity in the survey results.

The research is mainly conducted through correlational quantitative research to serve best the study aim and where the necessity arises experimental quantitative research will be applied too. Most of the studies on digital divide issues utilize quantitative research methods with pre-existing survey questionnaires focused on evaluating the digital divide of a certain population group (Vassilakopoulou & Hustad, 2021). Therefore, this research will attempt to utilize a mix-method approach by combining quantitative and qualitative research in order to justify its objectivity and reflection of real situations on the ground.

The data and statistics utilized in the previous sections of the thesis are collected from first-hand sources for ensuring the reliability of the research depictions. Local data sources include but are not limited to the available online data by the State Statistics Committee of the Republic of Azerbaijan, survey data collection of the E-Gov Development Center as well as the possibility of obtaining necessary data from the State Statistics Committee upon personal request through official channels.

b. Approach and Literature Review

The objective of the thesis is to understand the patterns of the digital divide in the Republic of Azerbaijan and give a prominent focus to the motivational factors of the divide. The research conclusion tries to find an answer to the question of if Azerbaijani citizens fulfill the requirements to sustain digital governance. As an argument for policy change and unexpected issues, the precedents of Azerbaijan's peer countries and CIS countries will be looked into.

Since the digital divide and digital issues have been a hot topic in the global academic trends, there is an immense number of academic researches done around the world to evaluate, propose,

indicate, and implement digital projects in order to enhance digital literacy, in this fashion, close the digital gap.

Although the topic of the digital divide is widely researched in the academic world, there is no sizable research related to the digital divide in Azerbaijan. As the digital divide is the main topic of this research there is a prominent space spared to the patterns of the digital divide and considerable attention is given to the reasons behind the divide. For properly understanding the problem, it is vital to determine the indexes determining the digital literacy level which changes from region to region and country to country, including various indexes backed by international institutions.

To the date of thesis writing, the research on the digital divide has been evolved by the works of mainly two authors, van Dijk and van Deursen. They have conceptualized various factors of the phenomenon and published articles broadening the descriptions of the digital divide and shortcomings of digitalization as well as suggesting ways out. They have outlined the determinants for the digital divide issue and argued that it is extremely difficult to catch up with the divide due to the continuous changes in its nature.

Although some comparative academic works exist in defining the variables of divide across nations, there is a substantive lack of research for policy responses to it overall which is not the subject of this research either. The research may be equalized with literature elaborating on the trends of the digital divide in fast-developing countries which prioritize technology and use of the internet for government solutions. Furthermore, this research is pursuing to increase the attention to the three-level system of the digital divide in public administration and analyze it in the case of Azerbaijan with quantitative methods. For achieving this purpose, the conceptual framework of the study has been developed and already presented in the previous section.

The literature review is tied to the current definitions and indexes and relevant data on the digital divide, its consequences, and measures to overcome the issue. The main source of literature includes academic research papers and international reports and data by the World Bank, Asian Development Bank, European Union's related institutions, World Economic Forum, OECD, etc. Most of the literature is available online with open access whereas the other part of the academic literature used in the thesis is obtained through SNU-affiliated academic databases.

The study prefers published journal articles to draw conclusions and findings over conference papers, master and doctoral dissertations, textbooks, and unpublished working papers since in most cases, they are not first-hand research sources and rely on journal articles themselves (Srinuan & Bohlin, 2011). Policy-oriented reports will be used only to define the current situation in Azerbaijan due to virtually nonexistence of academic journal articles related to the topic.

c. Data Collection

One of the most common methods of data collection in quantitative research is surveys. However, based on the research questions of a given study are allowed to employ a mixed-method by combining two or more methods. In case of a justification by research configuration, and time requirements, the researcher has a green light to resort into mix method approach. Bearing in mind the time restrictions and difficulty of traveling to the subject country for conducting interviews, the present study employs a survey as means of data collection.

For the purpose of data collection, an online survey was created using “Google Forms” and the participants were asked to fill up the survey using a form-generated link. The first section informed the participants about the ethics of the survey. The section also attempted to obtain participants’ consent for participation by clicking the “Next” button to start the survey and assured them of the confidentiality, security, and non-commercial use of their data. To guarantee the cogency of questionnaire contents, the study benefitted from the experience of global survey companies such as Pew Research Center and Gallup. However, the questions were customized to fit the study goals and prevent misinterpretation while translating from English into Azerbaijani.

The questionnaire has consisted of five sections. The first section was intended to inform the participants about the study and obtain their consent for participation. The second section was exploring the demographics and social background of the participants. The third section was focusing on the digital motivation of participants by learning their approaches to the use of digital technologies. Next section intended to gather data on the digital access of the participants by gathering data to find their possession of digital tools and internet access as well as health situation. The final fifth section was designed on the digital literacy issue and included a multiple-choice grid in the end for determining participants’ level of public service awareness. The survey

questionnaire and the model used for measurement are included in the Appendices section of this thesis (see Appendix 1).

To obtain an Azerbaijani perspective, participants residing in the capital city of Baku and regions were selected. For data collection sampling, multistage cluster sampling was used. This method enabled the survey to eliminate coverage error and increased the probability of participant selection from regions. For ensuring the data representativeness, an equal number of participants were selected from Baku and regions. Since the study is looking for differences in Baku versus all regions assembled disregarding the differences among regions themselves, the survey was not focused on the proportionate collection of data according to the population size of regions.

The survey was commenced on March 21, 2022, and lasted until April 18, 2022, for a total of 29 days. There was no incentive offered for participation in any kind or shape. The links to the survey were sent on social media and participants were chosen on a voluntary basis. Overall, 1,897 invitations for survey participation were sent, out of which 664 were answered and filled completely. The number corresponds to 35% participation which can be deemed satisfactory. Later, the dataset was examined to detect any incomplete, irrelevant, or useless data as well as that resulted in the deletion of only one case. Since the number of irrelevance cases was negligible in the dataset, the validity of the research was not affected by the action.

d. Data Analysis

Measuring the digital divide and the model

The consensus on how to measure the digital divide has not been reached yet. The digital divide definition and what comprises it are still subject to several dynamic debates. This issue is not only academic arguments but also policy debates alike which have already been discussed in the above sections. This thesis' digital divide index measurement is based on the belief that the measure of the digital divide encompasses one's opportunity to benefit from digitalization which is only possible in the case of digital prerequisites.

This study's index of the digital divide is based on 28 digital and 8 social background indicators (36 in total) on a scale of 0 or 1. The indicator for an individual's health access is part of both digital and social indicators. The indicators are grouped into five categories: personal background, digital motivation, digital access, digital literacy, and public service awareness. The mean of values

derived from the last four categories results in the overall digital divide index. The category indexes, in their turn, are the average score of the indicators in a specific category.

All the categories and the final index are interconnected and form an articulate theoretical whole. The conditions of access to the internet and the state of an individual being digitally motivated are perceived as sine qua non in all categories. Even the most minimalist measurements and approaches accept internet access as an inseparable part of digitalization.

The thesis employs a mixed method of the dichotomous and three-point scoring system in 36 indicators. Although the dichotomous system of scoring on a scale of 0 or 1 is not purely comprehensive, it offers an array of advantages over more comprehensive scales such as a scale of 1 to 10. To avoid grey areas, a scale of 0.5 is used where simple yes or no (0 or 1) is problematic. Henceforth, the model uses numerous three-point scoring systems that can also be interpreted as a concession between dichotomous and more comprehensive scales. The model with a relevant scoring system has been attached in the appendix of the thesis (Appendix 1).

The complications of more comprehensive scoring systems are plentiful. First and foremost, such scoring systems are difficult to define and offer guidelines on scoring for each indicator which can induce subjective, bogus, and non-standard scoring. For an instance, an indicator scored with 3 can be scored as 5 in a similar indicator. This action may contradict the prime principle of data analysis which is reliability. Although mix approach of dichotomous and three-point scoring is imperfect, the reliability of such a system is higher than more comprehensive systems in this analysis.

Variables

The independent variable, place of residence, was fashioned from the residence in Azerbaijan question in which the respondents were asked: “What city/region is your current place of residence?”. The question was open-ended and the respondents could input their city, town, or region into the answer box. In some cases, respondents filled the box in detail by including their addresses and postcodes. During the data cleaning process, detailed answers were deleted and only city/region names were retained. The answers corresponding to Baku were found and coded as 1 while the rest of the answers were coded as 0. The ratio of people residing in Baku is 50.53%

(Table 6) which is concluded as representative since the analysis is done based on Baku versus regions, hence, an equal number of samples are required.

The dependent variable, the digital motivation index, refers to the willingness of the population to use digital tools and obtain online services. In this category, six questions have been asked to determine six indicators. Four questions have been scored on a three-point scoring system (purpose of usage; time of usage; adoption to change; usage of digital public services), and the remaining two (usage change; frequency of public services usage) have been scored based on the dichotomous system. Since the purpose of usage indicator was a multiple selection question, the average of the indicator within itself was calculated. Later, the average of all six indicators was calculated to find the digital motivation index.

The digital access index consists of six indicators based on five questions. In this category, only one indicator has been measured based on a three-point scoring system (digital device access) the remaining indicators (internet device access; internet access; health access; financial access) have been marked by a dichotomous system. However, compared with other indicators, the question for internet device access has not been marked by 0 or 1, but 0.5 or 1 instead. The reason for such measurement stems from the researcher's belief that 0 would drag the final result down creating extreme values that may yield false results. Therefore, a relatively higher value of 0.5 has been decided appropriate for this dichotomous indicator. The question related to health access is also used as a separate indicator for the control variable which makes the total number of indicators of this category one unit higher than the questions asked. As a final action in this dependent variable, the average of all five indicators has been obtained to conclude the digital access index.

The digital literacy index has been organized based on seven questions and seven indicators (basic computer skills; creative skills; text processing skills; digital service skills; informational skills; technical knowledge skills 1; technical knowledge skills 2). The dichotomous scoring system has been used for all the indicators and the average of indicators has been calculated to sum up the digital literacy index in the same fashion as other dependent variables.

The public service awareness index is based on a question that lists the name of 10 public services rendered both physically and digitally. The participants are asked to choose one of four answers for each public service. The answers include yes, I am aware and apply; no, I am not aware; I do not have an idea about what this service is about; I am aware but do need it personally. The answers

have been marked by the dichotomous system with 1, 0, 0, and 1 respectively. Following the marking, an average of 10 groups have been obtained.

The researcher constructed an aggregate measure of the digital divide based on the previously explained four variables: digital motivation, digital access, digital literacy, and public service awareness. In the final result, values close to zero represent an individual's lack of understanding and benefit from digitalization whereas 1 represents digital inclusion. For the statistical analysis, five separate models have been run with each of the five dependent variables (Table 3).

Overall, six *control variables* have been employed for the research purpose (age, sex, education level, linguistic skill1&2, and health access). The variable of age is based on grouping respondents into seven categories of age and has been marked with a scale from 0 to 6 (Table 6). The sex variable is determined by the questions asking the respondents their gender and has been marked with 1 for females and 0 for males. The respondents preferring not to say their gender was marked with “-” which during the analysis part was deemed incomplete samples and were excluded from the analysis. 52.21% of samples used in the analysis were female participants and 47.79% were males which can be argued as representative of the population. Education level has been grouped into three and marked on a scale from 0 to 2. Individuals with high school education and lower were grouped as low education (0), vocation school education as middle education (1), whereas individuals holding bachelor's degrees or higher are deemed as highly educated (2) (Table 6). Linguistic skill 1 refers to the number of languages individuals speak. Monolingual participants have been marked with 0, bilinguals with 1, and multilinguals with 2 (Table 6). During the questionnaire, the respondents were asked to report all the languages they can speak at least at the intermediate level. Had the question been asked at a fluent level, the researcher believes that the results would be relatively different. Linguistic skill 2 refers to the ability of a respondent to speak the official language of the subject country which is Azerbaijani. 94.22% of participants are capable of speaking the official language, but 5.78% lack the command of Azerbaijani even at an intermediate level. The final control variable is about the health of individuals where they were asked: “Does any disability, handicap, or chronic disease keep you from participating fully in work, school, housework, or other activities, or not?”. The answers have been coded with a dichotomous system 1 for “No”, 0 for “Yes” or “Prefer not to say”.

Hypothesis

The study aims to find if the population's place of residence has an impact on their digital divide index. Therefore, the research hypotheses are stated below:

H₀: the place of residence does not have an impact on the digital divide index

H_a: the place of residence significantly affects the digital divide index

Data analysis

Since the study involves more than one dependent variable, multiple regression analysis is required to statistically analyze the data which provides the relationship between the independent variable and several dependent variables. To accommodate multiple dependent variables simple linear regression equation may be implemented accordingly:

$$Y = A_0 + A_1X_1 + A_2X_2 + A_nX_n$$

The main issue arises in deciding which dependent variables to pick up for the analysis during the multiple regression test. For the sake of accurate results, it is appealing to utilize entire relevant variables. Yet, this method of variable selection is frequently not viable. Disregarding the possible density of the final equation, the contribution of insignificant variables simply expands the error of the findings. Therefore, it is not recommended to select variables that increase error variance.

The main advantage of the multiple regression model is its ability to determine the comparative impact of one or more dependent variables over the independent variable. The other advantage of this model would be the possibility to identify outliers or extreme values in other words. For example, the analysis output may yield that all of the listed dependent variables were correlated to the independent variable, except one sample that outliers from normal values due to favorable effects.

The main disadvantage of the multiple regression model is inherently embedded in the use of data. This is usually due to the use of inadequate data and the fact that the model does not specify causality in phenomena. The pitfalls of inadequate data can be summarized as the lack of samples

which may lead to wrong findings. If the samples of a dataset are increased, the researcher may conclude the analysis with a different view.

Chapter 4. Findings

In this section, the researcher attempts to address the research questions as well as test the null hypothesis. First, the thesis scrutinizes the general condition of the digital divide issues in Azerbaijan and highlights the affected social categories in an attempt to answer the main research question. Then, it focuses on each of the remaining research questions separately and analyzes specific models for this purpose. In this phase, the research identifies the impact of social categories, ICT characteristics, and digital divide variations in these associations over capital cities versus regions and across variables.

a. Hypothesis and the RQ1: Impact of Place of Residence on the Digital Divide Indexes

To answer RQ1, the thesis discusses the findings of multiple regression analysis of five models each with separate dependent variables. The results of the findings can be seen in Table 3.

Table 3: Multiple regression model of the digital divide with respect to capital-provincial division

Multiple Regression Model of the Digital Divide with Respect to Capital-Provincial Division					
	Model 1	Model 2	Model 3	Model 4	Model 5
	Dependent Variables				
Variables	Digital Motivation Index	Digital Access Index	Digital Literacy Index	Public Service Awareness	Digital Divide Index
Intercept	0.512	0.427	0.490	0.486	0.479
Residence	0.026	0.015	0.021	0.021	0.021*
Age	-0.023***	0.009**	-0.054***	-0.005	-0.018***
Sex	0.011	-0.007	-0.046**	-0.023	-0.016
Education level	0.073***	0.032***	0.118***	0.027*	0.062***
Linguistic Skills (Number of languages)	0.079***	0.049***	0.103***	0.073***	0.076***
Linguistic Skills (Speaking official language)	-0.056*	-0.064***	-0.080*	-0.067	-0.067**
Health	0.055***	0.226***	0.007	0.033	0.080***
Model fit					
F-value	29.770***	46.820***	51.180***	4.460***	40.840***
Adj R-square	0.235	0.328	0.349	0.036	0.298

Note: p<0.1: *, p<0.05: **, p<0.01, ***

In Table 3, the research reports findings from multiple regression analyses carried out on the place of the residence conducted through SAS software. At first glance, the model fit of the regression analysis suggests that the adjusted R-square has high values for all the models except Model 4 (Public Service Awareness). The models explain that the percentage of the variations of the dependent variables is quite high. Overall, the regression model fits the data very well in the present study.

Therefore, the regression model used in Model 5 is significant that can be interpreted as a successful prediction of the digital divide index ($F_{7,649} = 40.84$, $p < .1$). The regression model elucidated 40.84% of the variance in the digital divide index. Participants' digital divide index was predicted by their place of residence ($\beta = .02$, $t = 1.65$, $p < .1$). For every increase in place of residence by 1-unit, the digital divide index increased by 0.02. Participants' digital divide index was also predicted by their age, gender, education, linguistic capacities, and health conditions after controlling for their variables accordingly.

Results from the analysis executed on the digital divide index (Model 5) revealed that there was a positive correlation between the place of residence and the digital divide index. Therefore, at 10% level, *we reject the null hypothesis*. Henceforth, there is a statistically significant difference in the digital divide level between the capital city of Azerbaijan and its regions. However, the impact of place of residence on the digital divide index is significant at a higher level of 10% and the size of the impact is relatively small.

Notwithstanding the argument in the previous paragraph, place of residence is not significant at any level in the sub-categories of the digital divide. Concluding the regression model performed for this research, place of residence does not affect individuals' digital motivation which can be paraphrased as the city or town they live in does not have a significant effect on their willingness to use digital tools. That being said digital motivation yields the largest gap between the capital city and regions. Digital motivation may be the category causing significance in the regression result of the Digital Divide Index.

A positive correlation is even lower in the category of digital access which means the individuals have virtually the same access to internet and digital devices to profit from digitalization. Digital Literacy Index and Public Service Awareness categories yield the same result and demonstrate no significance on the impact of place of residence over populations' literacy or awareness level.

According to the results of the analysis, the gender of population does not play a role in the digital divide. However, all the remaining categories indicate that they are highly associated with the capital-regional digital divide. Particularly, the digital divide is strongly significant concerning an individual's age, education level, number of languages, and health conditions. The research suggests that individuals with higher-level education are more likely to benefit from digitalization compared with a low or mid-educated population. Furthermore, multilingual or bilingual residents are more likely to benefit from digitalization than monolingual residents independent from their first language. This fact being considered, the ability to speak the official language of the state (Azerbaijani) also affects the digital divide among the population. Although not as strong as the number of linguistic skills, the ability to speak Azerbaijani is significant at 5% level which puts the Azerbaijani speakers at disadvantage. This fact is very astonishing and requires an in-depth analysis of its root causes.

Table 4: Descriptive statistics of the continuous variables

Descriptive Statistics of the Continuous Variables				
Variables	Means	Std	Min	Max
Motivation	0.695	0.214	0	1
Access	0.706	0.168	0.1	1
Literacy	0.600	0.285	0	1
Awareness	0.589	0.288	0	1
Divide	0.647	0.174	0.096	0.988

The most important factor in the capital-region digital division in Azerbaijan appears to be the age group of individuals which is negatively correlated to the digital divide index suggesting the increased age of an individual means less likely to resort to digitalization let alone benefitting from it. The study displays that younger populations in the regions are more likely to blend into the digitalization process than senior members of society. The digital divide in the aged population can also be a contributing factor to the dual divide considering their deteriorated health conditions. Unfortunately, this research is not investigating the age-related dual divide even though this topic may find an answer to underlying reasons for the divide in older age groups. Disregarding the

relation to age groups, the health of an individual is also a significant factor in the digital divide in the subject country. The questionnaire asked the respondents if any disability, handicap, or chronic disease kept them from participating fully in work, school, housework, or other activities. Those responding yes or prefer not to say are in the underprivileged segment of society regarding the digitalization process.

Since the first analysis could not conclude a huge divide between the capital city and the provinces, the study analyzed the urban-rural division by regrouping the place of residence. For this purpose, the cities of Gandja, Mingachevir, Sumgayit, and Nakhchivan were coded by 1 which have high urbanization levels alongside the capital city of Baku. The rest of the cities/towns/regions were coded by 0 for rural areas. The target of the second analysis of the urban-rural division is to evince the fact that cities other than Baku with high urbanization levels also possess the same rate of the digitally literate population.

Table 5: Multiple regression model of the digital divide with respect to urban-rural division

Multiple Regression Model of the Digital Divide with Respect to Urban-Rural Division					
	Model 1	Model 2	Model 3	Model 4	Model 5
	Dependent Variables				
Variables	Digital Motivation Index	Digital Access Index	Digital Literacy Index	Public Service Awareness	Digital Divide Index
Intercept	0.50	0.42	0.47	0.50	0.47
Residence	0.05***	0.02	0.04**	0.00	0.03**
Age	-0.02***	0.01**	-0.05***	-0.01	-0.02***
Sex	0.01	-0.01	-0.05***	-0.02	-0.02
Education level	0.07***	0.03***	0.12***	0.03*	0.06***
Linguistic Skills (Number of languages)	0.08***	0.05***	0.10***	0.07***	0.08***
Linguistic Skills (Speaking official language)	-0.05	-0.06**	-0.08*	-0.07	-0.07**
Health	0.05***	0.23***	0.01	0.03	0.08***
Model fit					
F-value	30.76***	46.90***	51.85***	4.36***	41.16***
Adj R-square	0.24	0.33	0.35	0.03	0.30

Note: p<0.1: *, p<0.05: **, p<0.01, ***

At first glance at the multiple regression analysis based on the urban-rural division as an independent variable, we may notice remarkable differences (Table 5). According to the results of the regression model 5, it is significant that can be interpreted as a successful prediction of the digital divide index ($F_{7,649} = 41.16, p < .01$). The regression model elucidated 41.16% of variance in the digital divide index. Participants' digital divide index was predicted by their place of residence ($\beta = .03, t = 2.07, p < .05$). For every increase in place of residence by 1-unit, the digital divide index increased by 0.03. As was the case with the previous analysis, participants' digital divide index was also predicted by their age, gender, education, linguistic capacities, and health conditions after controlling for their variables accordingly.

Results from the analysis executed on the digital divide index (Model 5) revealed that there was a positive correlation between the place of residence and the digital divide index which is significant at 5% level. With the results of the second analysis, we can argue that the exclusion of urban centers outside the capital city of Azerbaijan exacerbates the digital divide in the provinces. Compared with the capital-provincial division, the size of the impact is significantly huge concerning the urban-rural division. Therefore, the study concludes that there is a statistically significant difference in the digital divide level between the urban centers of Azerbaijan and its rural residence places.

Apart from the ultimate significance in the aggregated index of the digital divide, we observe statistical significance in the dependent variables of digital motivation and digital literacy levels at 1% and 5% levels accordingly which were indicated by null significance in the capital-provincial division. These results are interpreted as residents of rural districts are pointedly at disadvantage than the urban centers. In other words, the digital literacy level and particularly the digital motivation of residents to use digital technologies significantly drops as the study moves from urban places to rural areas.

Concerning the digital access and public service awareness of residents, the study still could not observe any significant relationship. It appears that the population of Azerbaijani rural areas has nearly the same access to technology as the urban centers and the government of Azerbaijan can be credited for its efforts to reduce the access issues in rural areas through subsidies and stimulus packages. Based on these results, the study is confident to claim that the motivational divide in Azerbaijan is not triggered by the lack of access to the internet or technologies. However, the

assumptions can be made that the use of digital technology does not interfere with the rural population's day-to-day activities, therefore, making it less appealing to resort to digital technologies for rural residents. Considering this fact, changes can be made to the agricultural and tourism sector, which are the main income sectors of rural areas in Azerbaijan, to guarantee financial incentives for increasing the rural population's interest in technology use.

Public Service Awareness of the rural population appears to be at the same level as the urban centers. The analysis yielded 0 correlation in this category ($\beta = 0.00$, $t = 0.07$, $p > .1$), meaning that the public service awareness rate does not change at all as we move from urban to rural areas which can be a positive prediction. However, the public service awareness level should be researched separately to find if the overall awareness level is satisfactory throughout the country.

b. RQ2: Which Social Categories are Mostly Affected by the Digital Divide in Azerbaijan?

Age - Participants' age is significant at 1% in the digital divide index in both analyses of capital-provincial and urban-rural division. Overall, the study yielded somewhat similar results in both analyses except for minor differences in correlation estimates. One-year increase in the age of participants resulted in a 0.02 index decrease in their digital divide index. Although the result was not the biggest coefficient across the variables, age still is an important factor impacting the population's digital behavior. The biggest divide in the digital behavior of senior members is observed in the digital literacy category of capital-provincial division ($\beta = -0.06$, $t = -8.79$, $p < .01$). Older people lack the necessary digital skills to participate in the digitalization process as their basic operational skills on a computer are not adequate for the purpose. This would also explain the reason for the significant drop in participants' digital motivation as the age indicators grow bigger.

Although the access divide was not as significant as literacy and motivation, it is also one of the biggest factors to impact the digital divide of elderly people. However, this category is open to discussion if the lack of motivation of senior members makes them unwilling to obtain the necessary means for getting access to the internet and digital world or if they lack the material means to obtain devices and internet subscriptions. This question is subject to separate research, but it has huge importance for understanding the underlying reasons for the age-related digital divide in Azerbaijan.

Despite the persistence of digital divide in all categories, public service awareness of elderly people seems not to fall behind those of younger as they demonstrated a somewhat satisfactory level of informational access and awareness of government offers of both physical and digital public services. This factor strengthens the researcher's belief that the underlying reason for the age-related divide is rooted in the digital literacy level of old people which restrains them from resorting to digital public services causing a lack of motivation that highly affects the overall digital divide level of elderlies.

Education level - One of the substantial explanations for the digital divide appears to be the education level based on both analyses. The impact of participants' education level is significant at 1% in digital indexes. This observation is valid across all the variables except public service awareness. Education level is positively correlated to the digital divide in all models and a categorical increase in the education level of the population results in a 0.06 index increase in their digital divide index. This stays valid in the urban-rural division as well which gives us enough reasons to conclude that the education level affects the overall digital divide throughout the subject country.

The highest correlation is observed in the digital literacy category which gives enough ground for the study to conclude that the digital literacy level increase in parallel to the general knowledge of the population. The correlation result of the participants' education level in digital literacy is also the highest in the regression analysis overall. Higher education level also has a positive impact on the digital motivation of the population to use digital tools for obtaining public services which may have an impact on the increased level of digital access. The analysis proves that a higher education level equals higher access to the internet and technological devices.

Interestingly enough, controlling education level with public service awareness reveals that although significant at 10% level, it does not mean highly educated people have comprehensive information about the public services. The fundamental reason could be a lack of outreach strategy by local and central public offices that require far-reaching social campaigns in order to inform citizens about the services public offices provide. Since digital public services are in the interests of the general population, they would highly be interested in applying for digital public services. Therefore, the big correlation difference between digital motivation and public service awareness can only be explained by the flawed information strategy of public offices. The finding of the study

supports the argument of a policy report published in 2019 that currently eGovernment of Azerbaijan offers more services than demanded by the citizens (ADB, 2019). Indeed, the lack of demand seems to be insufficient knowledge among the population about the services they are entitled to receive.

Linguistic skills (number of spoken languages) - Among all the controlled variables linguistic skills are the most significant at 1% level across variables and seem to have a higher positive correlation with all variables, it was controlled with. Apart from a highly significant rate, and positive correlation, linguistic skills have the most impact on the digital divide index overall. Attributing to the research, we may confidently say that the number of languages spoken by individuals increases their technological and digital interaction.

Another important factor to bear in mind while examining the subject country is the level of linguistic skills its population possesses. 65.91% of the population indicated that they are multilingual whereas only 6.09% of the population was monolingual. There are various historical and cultural factors in the high level of multilingualism in Azerbaijan. However, it should be noted that one reason why the present study may report higher linguistic ability than the others is due to the nature of the question in the survey. The questionnaire was asking for the respondents to indicate all the languages they speak at or higher than intermediate level. If the survey was asking for only advanced language skills to be reported, the figures would appear differently. Nonetheless, to fulfill the present research aim including the knowledge of intermediate language skills was crucial as numerous studies suggest the possible effect of any kind of linguistic capabilities.

The impact of linguistic capacity on digital literacy is a widely discussed topic in academia and the thesis will not address those issues since they are not the objective of the study. However, research on the effect of multilingualism suggests that the young people's ability to navigate through various cultures, languages, and science fields exposes them to technological advances since digital tools support and indeed expand their endeavor for evocative social connections (Han, 2021). Linguistic knowledge individuals possess enables them to stay a part of the connected world through digital tools for exchanging ideas and getting them accustomed to the use of digital technologies. Hence, they become the biggest beneficiaries of digitalization and digital public service provision.

The abovementioned argument is particularly true when we look at the control of the digital motivation index ($\beta = 0.079$, $t = 5.53$, $p < .01$). The coefficient test yields the result that the number of languages an individual speak is positively correlated and an increase of one language in the linguistic skill of an individual result in a 0.079 increase in the digital motivation index. Linguistic skill's correlation with digital literacy level is particularly worth attention as its result is similar to the control of education level. Since the ability to speak a language can be considered as a part of the education component, they solidify the argument on the impact of general education on digital literacy and computer skills. Multilingual people also demonstrated the highest correlation with public service awareness. This can be explained by their access to international information sources and its effect on staying up-to-date with recent developments as well as being open to novel developments.

Health - The control of the health condition of an individual is significant at 1% level in three categories (digital motivation, digital access, and overall digital divide index) while it is not significant in digital literacy and public service awareness. Indeed, individuals with limited health conditions are more inept in public awareness than any other controlled social group by falling behind only multilingual people. Although the digital literacy level is not satisfactorily controlled by the health conditions, it is not significant to argue about the impact of limited health conditions on the digital literacy level.

Significance at 1% level in digital motivation and digital access requires thorough scrutiny of the country's context concerning the opportunities provided to populations with a limited health condition. Control of health on digital access suggests that the biggest divide in Azerbaijan is between the individuals with limited health conditions and health participants of the society ($\beta = 0.23$, $t = 15.76$, $p < .01$). The correlation result is the biggest value across all five models, and all categories and requires urgent policy attention by responsible institutions for providing them equal opportunities and fully integrating them into society. Bridging the gap in the health-related divide issue will also positively contribute to the digital divide index of the country overall.

Gender - gender does not play a significant role in impacting the digital divide index in this finding. However, it is significant in digital literacy level where male participants of the study are more competent than female participants in terms of computer skills. Regarding the computer skills of females in more rural areas, it appears to be more significant at 1% level in the urban-

rural division whereas the significance level in the capital-provincial division is at 5%. Therefore, more rural areas significantly affect the computer skills of female citizens putting them in a dangerous digital divide. Females, on the other hand, appear to be more motivated than males to utilize digital tools. The analysis suggests that the results of males and females are almost identical regarding the remaining categories of digital access, public service awareness, and aggregated digital divide index.

To conclude, the findings of both analyses regarding the capital-provincial and urban-rural divisions are somewhat similar to each other while observing the control variables. Results in age, education level, linguistic skills, and health conditions remain the same across all categories with minor differences in correlation estimates. Gender-related divide on the other hand seems to take a more serious form regarding the urban-rural divide, changing the statistical significance from 5% level to 1% level.

Table 6: Descriptive statistics of the categorical variables

Descriptive Statistics of the Categorical Variables		
1) Variable a) Category	Frequency	Ratio (%)
1) Place of residence (capital-provincial division)	657	100
a. Baku	332	50.53
b. Regions	325	49.47
2) Place of residence (urban-rural division)	657	100
a. Urban centers	384	58.45
b. Rural areas	273	41.55
3) Age groups	657	100
a. 19 or below	83	12.63
b. 20 - 25	100	15.22
c. 26 - 35	167	25.42
d. 36 - 45	104	15.83
e. 46 - 55	81	12.33
f. 56 - 70	96	14.61
g. over 70	26	3.96
4) Sex	657	100
a. Male	314	47.79
b. Female	343	52.21
5) Education level	657	100
a. General & full secondary school	134	20.4
b. Vocational education	109	16.59
c. Bachelor's degree and higher	414	63.01

the digital divide ($r = .71$, $n = 657$, $p < .001$), and the relationship was significant. The analysis yielded the strongest positive correlation between the digital literacy index and the digital divide with a significant relationship ($r = .82$, $n = 657$, $p < .001$). By these results, we may conclude that increase in the digital literacy index and the public service awareness of an individual were correlated with increases in the digital divide index.

To conclude the magnitude of the observed correlation coefficient, the interpretation of Table 8 was used in the present study.

Table 8: Interpretation metrics of the correlation coefficient analysis

Interpretation Metrics of the Correlation Coefficient Analysis	
Absolute Magnitude of the Observed Correlation Coefficient	Interpretation
0.00 - 0.10	Negligible correlation
0.10 - 0.39	Weak correlation
0.40 - 0.69	Moderate correlation
0.70 - 0.89	Strong correlation
0.90 - 1.00	Very strong correlation

Source: Schober, P., Boer, C., & Schwarte, L. A. (2018, May). Correlation Coefficients: Appropriate Use and Interpretation. *Anesthesia & Analgesia*, 126(5), 1763-1768.

Chapter 5. Conclusion

a. Summary of the Thesis

This research aimed to identify the extent of the digital divide in Azerbaijan concerning the place of residence, and whether the divide is persistent between the capital city Baku and the rest of the country. The research was conducted based on quantitative analysis utilizing a dataset collected by the researcher through a research-specific survey. Through the methods utilized, the research produced results indicating the areas where the digital divide persists. The analysis part of the research focuses on the outputs of the multiple regression model which was the statistics test utilized in the research.

Based on the quantitative analysis, it can be concluded that the digital divide of the population of Azerbaijan is somewhat similar in the capital-provincial division while analyzing the categories of the digital divide issue separately. However, the aggregated result of the digital divide index yielded an outcome that concluded the existence of the digital divide in terms of capital-provincial division. According to the research results, the present study rejected the null hypothesis built upon the idea that there is no impact of place of residence on the digital divide level of the population of Azerbaijan.

However, the size of the impact from the analysis was not enormous. The researcher believes that the final result of the analysis is because of other urban centers were included in the provincial value of the independent variable. Therefore, the response samples from urban centers such as Gandja, Mingachevir, Sumgayit, and Nakhchivan were excluded from the provinces and included in the same value as Baku. Hence, a new place of residence variable was created based on the urban-rural division differing from the previous capital-provincial division. As was anticipated, the new analysis yielded significance at 5% level in the overall digital divide index with a bigger impact size as well as significance at 1 % level in digital motivation and 5% level at digital literacy. This analysis played a crucial role in concluding that the urban centers outside Baku benefit from digitalization as much as the capital city whereas the rural areas find themselves at a significant disadvantage in the digital age.

Another surprising finding of the research was related to the gender division where the analysis results showed insignificance regarding the gender-related digital divide. In some categories, females generated more positive results than males. For example, the research concluded that the female participants of the survey are more motivated to use digital tools than males. The only category where gender-based analysis was significant was related to the digital literacy level implying the ability to use computers or other digital devices. This indicator expressed lower results in rural areas.

The most significant category affecting the digital divide level appeared to be the linguistic indicators. According to the data collected, the more language skills an individual possesses better his/her performance becomes regarding the digital divide issue. Despite what was said, this category also does not come without its drawbacks. Since the regression analysis is not hundred percent causal and is extremely sensitive to the quantity of data, the results of the research might be affected by the lack of sample size for the monolingual people because more than 60% of the respondents were multilingual and only 6% monolingual.

The core of interest regarding linguistic capability is the ability to speak the official language. The result found that ethnic minorities or immigrants not having adequate command of the subject country's official language, Azerbaijani, benefit more from digitalization than those who are well capable of speaking Azerbaijani. The fact should be a subject of another scholarly research for getting a better grasp of the reasons that may yield to the divide which puts the official language speakers at a disadvantage that goes against common sense in academia and politics alike.

However, the current study believes that two factors impact the outcome reached through the analysis: 1. Usage of Russian by ethnic groups; 2. Resilience of Russian speakers. Due to the Soviet past of Azerbaijan, Russian was considered to be the lingua franca among the titular ethnic majority and remaining ethnic minorities of the Union States (Abbasova, 2017). This approach started to change after the fall of the USSR and Azerbaijani turned to be the lingua franca of ethnicities in Azerbaijan (Garibova, 2020). Despite the fact, older and medium-age generation still use Russian to communicate with other language agents while young people from ethnic minorities have fluency in Azerbaijani (Gerber, 2007; Clifton, Lucht, Deckinga, Mak, & Tiessen, 2005). This aspect is especially striking among the Lezgi ethnic minorities who prefer to use Russian for communication even when their residence is in Baku (Gerber, 2007).

As a result of Soviet's policy to present Russian as an academic language, agents of Russian speakers take pride in Russian being their first language and refuse acknowledging the literacy of Azerbaijani (Luscombe & Kazdal, 2014). Azerbaijani government ensures the operation of Russian schools where the medium of instruction is completely in Russian and give the same opportunities to Russian speakers as the Azerbaijani speakers (Garibova, 2020). Therefore, the underlying reason for better performance of non-official language speakers can be the use of Russian by non-titular minorities as lingua franca and the resilience of Russian language speakers which benefit from the opportunities of both Russian and Azerbaijani.

On the other hand, the health-related digital divide issue seems to be the most urgent question to be addressed by the government authorities since the subject country's citizens with limited health conditions demonstrate the lowest rate of digitalization and motivation to do so. However, their digital literacy level does not seem to be affected by their motivation and they perform quite as well in this category. Therefore, the government should address certain questions to better address their needs and integrate or reintegrate them into society as a whole for which certain experiences and possibilities are discussed in the policy recommendations parts.

When it comes to the education level, as was expected, the digital literacy level increase in parallel with the education level of individuals. This manifests itself regarding the linguistic capabilities that are an inseparable part of education itself. Therefore, increasing the general education level in a society can be concluded as an effective way of bridging the digital divide in so many aspects. Azerbaijan as a country boasts with 100% literacy level and with a high number of citizens possessing at least a bachelor's level seems to perform well in this sense. However, the results demonstrated cases where low-educated individuals performed poorly in the digital divide index. Hence, although not significant, problems exist in this sphere that requires urgent policy actions too.

It can be concluded that although the study does not demonstrate precise locations in the subject country where the digital divide persists more than the others, it brings about the issue into the highlight. This work is significant in the sense that it lays the groundwork for upcoming researches on the topic by indicating what spheres to be studied in depth. The study also points out the social categories in Azerbaijan that are more vulnerable to the digitalization process and their needs

should be accounted for in future policy-making processes regarding digital public service rendering. Henceforth, there is an array of opportunities for research on the digital divide topic.

b. Limitations of the Methodology

Recently, scientific research expanded to encompass digital inequality whereas, in the past, digital divide literature was mostly about the policy-oriented reports only focusing on internet access (Vassilakopoulou & Hustad, 2021). Unfortunately, scientific research has not yet expanded to include the digital divide in Azerbaijan. The lack of prior academic research on the study topic related to Azerbaijan and the potential difficulty to extract information may pose challenges to the research. Therefore, the research lacks reflection on local research and mainly relies on international reports as well as the statements of a local government official to a certain extent.

Another drawback of the research is an immense number of researches on the theoretical aspect of this topic and the challenge of gathering and implementing all the theoretical knowledge in the thesis. However, for ensuring the most beneficial outcome of the research, the research focuses on finding and including the most relevant research to the case of Azerbaijan.

The lack of definition for the technical terms of digitalization poses another challenge for the researchers to adopt a universally accepted standard for reading. To maintain consistent language in the thesis, the researcher has described the terms relevant to the study and uses the language described hitherto. However, the constantly changing nature of the description for technical terms may end up in irrelevance of the language of the thesis in the future.

In this thesis, the survey questions focus on only current digital divide issues which hinders the opportunity to look into the tendency in digital divide issues in the subject country. Considering the time and resource constraints, it was only possible to investigate one dimension of the dividing issue instead of looking into the situation depicted a few years past. While the survey questionnaire is justifiable by the research questions, it would present more opportunities to cover the digital usage patterns of citizens a decade earlier. This would help us understand what policy strategies of the government affected the mitigation or aggravation of the digital divide in certain variables. When it comes to surveying questionnaires related to the digital literacy category, survey respondents may have over or less self-evaluated their capabilities on how to use technologies.

Nevertheless, the survey was sufficiently conducted to analyze the phenomenon of the digital divide.

The linguistics-related question of the survey may pose the biggest limitation to the thesis for several reasons. First of all, participants are given the liberty of self-evaluation since otherwise is not possible. The other issue is related to the sample size of the monolingual respondents. Monolingual respondents comprise only a little more than 6% of the overall responses. Although this number can be well representative of the monolingual population in the subject country, it may hinder fair results regarding the digital divide among linguistic groups since the multiple regression analysis is extremely sensitive to the number of samples.

Furthermore, the digital divide issue in this thesis has been analyzed with a horizontal approach by regarding it as citizens' capabilities while disregarding the legitimacy of government on impacting the skills or motivations of citizens by digital policies. Adopting a methodology to analyze the effects of government policies in motivating citizens would demonstrate a meticulously comprehensive analysis of the phenomenon enshrining a prominent academic position.

c. Policy Recommendations

The researcher outlined several policy recommendations required to achieve sustainability of digitalization and address the complications encountered by the underprivileged segment of society. These recommendations have both direct and indirect effects on accelerating the digitalization process of the subject country and its citizens' digital knowledge by bridging the digital gap.

Vocabulary of public services. First of all, the survey recognized the urgency of applying a standard form of vocabulary used by the general population and public offices. Most of the respondents of the survey failed to answer the correct question regarding the technical terms used in public offices. In physical public service rendering, this may not cause a problem since there is always a presence of an officer to understand the needs of citizens. In the case of online service rendering, however, citizens are alone with websites or platforms that do not have much to help them to find what they need. Therefore, extensive, tiring, and out of vernacular technical terms

should be brought up to the official usage at least in the front end whereas in the back end public offices may continue the usage of convenient terms.

Instruction of Computer Sciences at the grassroots level. Although Informatics (Computer Sciences) are conducted as a subject starting from the first grade at all schools in Azerbaijan, it is still not a subject of interest for Azerbaijani students since they are not required to take an exam for university admission. The irrationality of the case becomes obvious when we realize the fact that the State Exam Center of Azerbaijan (SEC) requires students to sit for the Chemistry exam instead of Informatics to get admitted into the majors of Computer Sciences, Mechatronics, Telecommunication Engineering, Aerospace, etc. SEC used to claim that the reason behind it is the lack of preparation from the Ministry of Education which does not have enough teachers with adequate capacity due to low salaries. Despite the fact that in early 2022, SEC announced its intention to require Informatics as a major subject for university admission, it is still doubted by the society since it had previously announced that Informatics questions would be presented as part of the Math exam which was not imposed later.

Whatever the reason might be, the Ministry of Education and SEC should come to a mutual understanding that the lack of incentives to study Informatics at the grassroots level ultimately affects preparing professionals for the digitalization of Azerbaijan and adequately knowledgeable citizens in terms of digital literacy. The importance of high-quality Informatics classes is plentiful which can be boosted by paying multifaceted attention to the conduct of the subject which can be achieved by requiring evaluation of students' skills through the State Exam Center. Training from an early age increases students' capacity to better adapt to the digital age and operate confidently in such an environment. Transferring the habit of active computer control to students also increase their creative working abilities by reducing the time to develop educational skills as well as increasing the number of performed tasks (Pardaboyevich, Abdunazirovich, & Saydullayevich, 2020). All these facts ultimately affect the overall digital skills of the population which is important to sustain Azerbaijan's digital development. Therefore, the Ministry of Education and SEC should take responsibility for the task to intensify the attention to the conduct of Informatics starting from early school years by increasing the salaries of Computer Sciences teachers by the Ministry of Education and including Informatics as a major subject for the university admission by SEC.

Creating communication channels with academia. The organizations related to the digitalization of public services in the Republic of Azerbaijan have little or nearly no contact with digital experts in academia both globally and locally. This prevents their activities from being spotlighted in scholarly domains that ultimately affect recognition in global policy reviews. Establishing a comprehensive network with digital policy experts and scholars will increase the possibility of attention given to the digitalization process of Azerbaijan as well as revealing the shortcomings of the process and proposals to close the gaps. Constant contacts with digital scholars, participation in academic conferences, and offering grants for academic research create cumulative opportunities and reputation. There are several issues requiring clarification for their position in Azerbaijan - such as the digital government evolution model, the possibility of networked governance in the subject country, and the publication of a policy review government journal - with coordinated efforts of partners and international experience. This may serve as an excellent point to involve international experts in the digitalization process of Azerbaijan. These issues also necessitate building a strict evaluation of precedents so that the organizations learn what works.

Transition of data to the government cloud. Additional policy priorities for the Azerbaijani government should include accelerating the transition of public data into gCloud. Thus, the government will achieve efficient digital solutions for the analysis and process of public data by cost and labor efficiently. Hence, we may argue that the most important aspect of gCloud is optimizing IT expenditures of government and diverting it into the solidification of digital knowledge in public. It is necessitated by the lack of professionals in the IT field for effective use, integration, analysis, and overall processing of data which links the increased attention to the education of computer sciences recommended earlier in this section and the transition into the gCloud.

Responsive policy priorities. Moreover, the government of Azerbaijan is not responsive to adopting policies regarding the digitalization process promptly. Several policies are still on the pending list of the government to pass into law. In this sense, two decrees of the President of the Republic of Azerbaijan become the center of attention since they have failed to be accomplished by the indicated period.

The most important among them is the decree for the *Digital Transformation Concept* that was signed in April 2021 and expected to be prepared within four months by the Cabinet of Ministers

of the Republic of Azerbaijan (The President of Azerbaijan, 2021). It was expected to be a comprehensive strategy to outline the roadmap for the digital transformation of Azerbaijan. Another important document that is pending its execution is the *Innovation Strategy of Azerbaijan*, which was signed three years ago and trusted to the Presidential Administration for execution (The President of Azerbaijan, 2019). However, both documents have not been completed and presented to the public so far which hinders the systematic digitalization of Azerbaijan by a lack of clear understanding of the government's priorities.

Another important decree is the preparation of *Smart City and Smart Village Concepts* by the Presidential decree of 2021 that has not been fulfilled yet (The President of Azerbaijan, 2021). Interestingly enough, several Smart Cities and Smart Villages have been established and inaugurated in Azerbaijan after signing the relevant decree, but the concept has not been released to the public yet. Considering the constant changes in technology and the digital world, such precedents of late adaptation of strategies are not commendable and hinder rapid sustainable digitalization in the subject country. Therefore, a more comprehensive mechanism should be imposed to keep the compliance of relevant authorities with the President's decrees and ordinances.

In addition to the stances above, here are some additional policy recommendations to be considered for the policy priority list:

- ***Right to make a mistake in good faith.*** The government of Azerbaijan needs to take steps to pass a law granting the right and establish an error-and-trial website to increase digital literacy, especially digital motivation for those who are afraid of the adverse effects of obtaining public services digitally. The precedent of such a law exists that may benefit the subject country in reforming its relationship with its citizens. The law should intend to change the behavior of government from mistrust to citizens perceiving the first mistake as a mistake in good faith. In other words, the government recognizes the incapacity of citizens to act flawlessly in a digital environment by granting them the right to make a mistake without legal consequences in order to create incentives for digital public services. The mentioned law will help those standing on the other side of the digital gap to get adopted into digitalization with increased motivation by eliminating the fear of legal consequences.

- ***Digital Government Strategy.*** Leading digital societies have their respective National Digital Government Strategies to reference and pinpoint shortcomings for improvements. The Republic of Azerbaijan lacks such a publication while the President of the Republic has signed several decrees for digital transformation. The decrees have been highlighted in the earlier parts of this section. Instead of adopting separate policy papers to facilitate digitalization, the government needs to adopt a nationwide Digital Government Strategy overseeing all aspects of digitalization in the subject country. This policy recommendation will require coordinated efforts and participation of several central government ministries and subordinate agencies within a working group to prepare such a comprehensive policy document.

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Appendices

Appendix 1. Questionnaire and the Model

Personal Information

1. Please, tell us your name and surname: (Optional)
 - a. _____
2. Please, select the age group you belong to:
 - a. (0) 19 or below
 - b. (1) 20-25
 - c. (2) 26-35
 - d. (3) 36-45
 - e. (4) 46-55
 - f. (5) 56-70
 - g. (6) Over 70
3. Please, specify your gender:
 - a. (0) Male
 - b. (1) Female
 - c. (-) Prefer not to say
4. What is the highest level of education you have already completed?
 - a. (0) General Secondary School Education (9th-grade certificate)
 - b. (0) Full Secondary School Education (11th-grade attestation)
 - c. (1) Vocational education
 - d. (2) Bachelor's degree
 - e. (2) Master's degree
 - f. (2) PhD
5. Please, select all the languages you can speak at least at the intermediate level: (Select all that apply)
 - a. Azerbaijani
 - b. English
 - c. Turkish
 - d. Russian
 - e. French
 - f. Other (please specify)

0 - monolingual

1 - bilingual

2 - multilingual

0 - non-Azerbaijani speakers

1 - Azerbaijani speakers

6. What city is your current place of residence?

a. Open question

Analysis (1)

(1) - Baku

(0) - Regions

Analysis (2)

(1) - Urban

(0) - Rural

Digital Motivation

1. Purpose of Usage

Please, explain how do you use digital technology or the internet? (Select all that apply)

- a. (0.5) Video calls/conferencing – family, friends, and relatives
- b. (1) Video calls/conferencing – professional or educational activities
- c. (0.5) Social media, social interaction
- d. (1) Obtaining groceries, food, or using essential services such as utility payments
- e. (1) Remote work and employment aside from freelancing
- f. (1) Freelancing
- g. (0) Entertainment, streaming, video platforms, hobbies
- h. (0.5) As a way to find and search for information/news
- i. (0) Religious services/activities
- j. (0) Other

(1) Productive, professional, transactional, and creational activities

(0.5) Informational activities

(0) Passive usage

2. Time of Usage

About how often do you use the internet?

- a. (1) Almost constantly
- b. (1) Several times a day
- c. (0.5) About once a day
- d. (0) Several times a week
- e. (0) Less often
- f. (0) I do not use the internet

3. Usage Change

Compared with before the beginning of the coronavirus outbreak in February 2020, have you used digital technology or the internet in any new or different ways?

- a. (1) Yes, I have
- b. (0) No, I have not
- c. (0) I did not realize

4. Adoption to Change

Thinking about how people might use the internet during the COVID-19 pandemic... Do you think people who do NOT have high-speed internet access at home are

- a. (1) at a MAJOR disadvantage
- b. (0.5) at a MINOR disadvantage
- c. (0) NOT at a disadvantage

5. Frequency of Public Services Usage

How often do you apply for public services, for example, ASAN Service?

- a. (1) Once a year
- b. (1) Several times a year
- c. (1) Once or twice a month
- d. (1) Frequently (more than twice a month)
- e. (0) Someone else applies for me
- f. (0) I do not apply at all

6. Usage of Digital Public Services

Do you apply for or are aware of digital public services without leaving your place of residence through public platforms, for example, my.gov.az; or e-gov.az?

- a. (1) Yes, I apply
- b. (0) No, I do not apply
- c. (0) I do not feel the necessity
- d. (0.5) I would like to get digital services but I do not know how

Access

1. Digital Device Access

Please, tell me if you happen to have each of the following items, or not. Do you have... (Select all that apply)

- a. A tablet computer
- b. A desktop or laptop computer
- c. None

(1) If owns both of the devices

(0.5) If owns one of the devices

(0) If owns none of the devices

2. Internet Device Access

Which one do you prefer as the main device to use for the internet?

- a. (0.5) Phone

- b. (1) A tablet computer
- c. (1) Desktop or laptop computer

3. Internet Access

Do you subscribe to higher speed broadband services such as DSL, cable, or fiber-optic service?

- a. (1) Yes
- b. (0) No

4. Health Access

Does any disability, handicap, or chronic disease keep you from participating fully in work, school, housework, or other activities, or not?

- a. (0) Yes
- b. (1) No
- c. (0) Prefer not to say

5. Financial Access

During the coronavirus outbreak, have you had trouble paying for the following? (Select all that apply)

- a. (0) Your cellphone services
- b. (0) Your high-speed internet service at home
- c. (0) Your cable or satellite television subscription
- d. (1) I did not have any payment issues

Digital Literacy

1. Basic Computer Skills

Do you know how to copy and move files (e.g. documents, images, videos) between folders, devices, or on the cloud?

- a. (0) I don't know how to do it
- b. (0) I can do it with help
- c. (1) I can do it on my own
- d. (1) I can do it with confidence and, if needed, I can support/guide others

2. Creative Skills

Do you know how to create a profile in digital environments for personal or professional purposes?

- a. (0) I don't know how to do it
- b. (0) I can do it with help
- c. (1) I can do it on my own
- d. (1) I can do it with confidence and, if needed, I can support/guide others

3. Text Processing Skills

Do you know how to create and edit digital text files (e.g. Word, OpenDocument, Google Docs)?

- a. (0) I don't know how to do it
- b. (0) I can do it with help

- c. (1) I can do it on my own
- d. (1) I can do it with confidence and, if needed, I can support/guide others

4. Digital Service Skills

When I do not have enough information about public services, I am able to find solutions on the Internet.

- a. (0) I don't know how to do it
- b. (0) I can do it with help
- c. (1) I can do it on my own
- d. (1) I can do it with confidence and, if needed, I can support/guide others

5. Informational Skills

When you get public service news and information from each of the following types of sources, how do you primarily get that news? (Select all that apply)

- a. (0) A print newsletter, booklet, or brochure
- b. (1) A digital newsletter or public institution's website, app, or email
- c. (1) The public institution's social media posts
- d. (0) I am not interested in public service news

6. Technical Knowledge Skills 1

Which one of the following technical terms describes the document needed to travel abroad?

- a. (0) Civil Act (Vətəndaşlıq vəziyyəti aktı)
- b. (0) Foreign passport in Russian (Zaqranıçını pasport)
- c. (1) International passport (Ümumvətəndaş pasportu)
- d. (0) Foreign passport in Azerbaijani (Xarici pasport)
- e. (0) Permission passport (Buraxılış pasportu)
- f. (0) I do not know

7. Technical Knowledge Skills 2

Which one of the following technical terms describes the document proving the ownership of a property?

- a. (0) Reference note of state registration about restriction (encumbrance) of rights and description over the real estate (Daşınmaz əmlakın təsvirinə, dövlət qeydiyyatına alınmış hüquqlara və onların məhdudlaşdırılmasına (yüklülüyünə) dair dövlət reyestrindən arayışların verilməsi)
- b. (1) Extract from the State Registry of Real Estate on Rights' State Registration (Hüquqların dövlət qeydiyyatı haqqında daşınmaz əmlakın dövlət reyestrindən çıxarış)
- c. (0) I do not know

8. Public Service Awareness

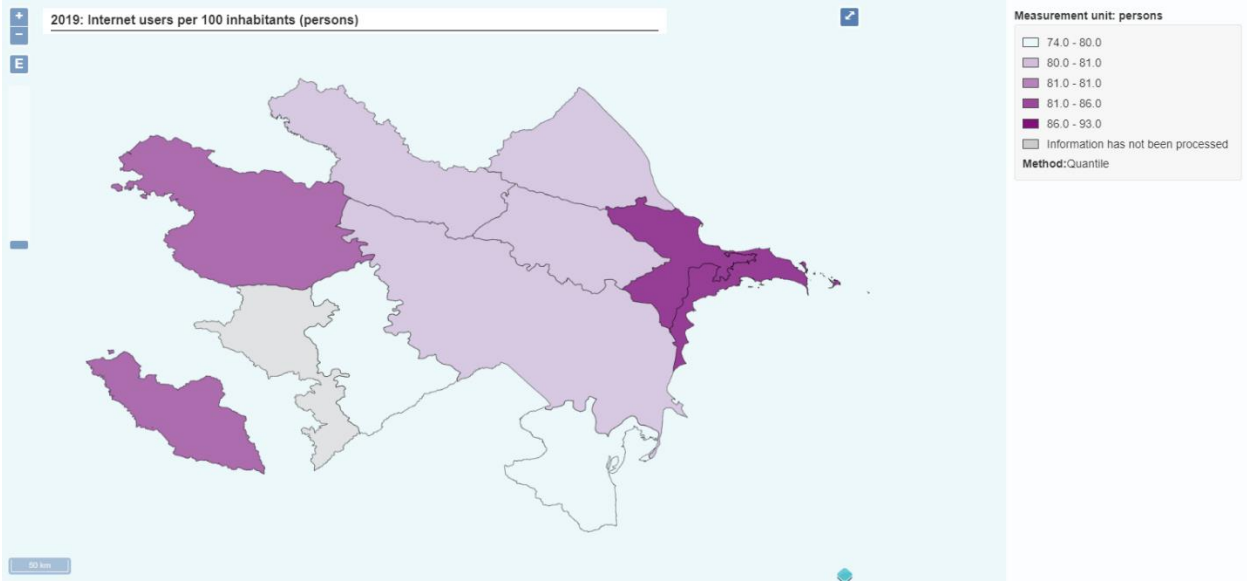
Are you aware that you can apply for the below public services online without leaving your home? (Please, choose the answers separately for each service)

Options: (1) Yes, I am aware and apply; (0) No, I am not aware; (0) I do not have an idea about what this service is about; (1) I am aware but do need it personally

- a. COVID-19 related certificates and references
- b. Application for marriage registration
- c. Application for birth registration
- d. Application for death registration
- e. Issuing power of attorney
- f. Reference of employment
- g. Reference of a diploma, international passport, national ID card, and driving license
- h. Payment of traffic fines
- i. Payment of administrative fines, tax, and customs fee
- j. Payment of utilities (cable TV, internet, communication, electricity, gas, water etc.)

Appendix 2. Internet Users of Azerbaijan: Reflected on Map

Map 1: Internet users in Azerbaijan per 100 inhabitants (persons) in 2019



2 Data Source: Statistical Committee of the Republic of Azerbaijan

국문초록

공공서비스 제공의 디지털 격차: 아제르바이잔의 사례

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글로벌행정전공

정보통신 기술은 디지털 환경에서 적응할 수 있는 사람들에게 상당한 혜택을 줄 수 있으나 그 분야의 반대편에 서 있는 사람들은 자신들을 사회의 소외된 계층으로 보았다. 아제르바이잔 공화국에서 디지털화가 빠른 속도로 진행되는 환경에서 도시-농촌 정보격차는 일반적으로 인정되고 있으나, 세부적 내용은 지금까지 연구되거나 보고되지 않았다.

본 논문에서는 아제르바이잔 공화국의 정보 격차 범위를 식별하고 디지털화 과정에 관한 사회의 가장 취약한 범주를 탐지하기 위해 데이터를 분석하였다. 특정 데이터를 기반으로, 이 연구는 대상 국가의 수도 외곽 지역 및 지역에서 공공 서비스 렌더링에서 디지털 소외의 추론을 입증한다. 본 논문은 주로 대상국 사회의 여러 범주를 포함한 다중 회귀 분석을 통해 수행된 통계 분석 결과를 바탕으로 결과를 도출하였다. 현재 아제르바이잔 정책 결정의 예는 연구에서 검토되었고 디지털 연결을 증가시키기 위해 정책 권고안이 만들어졌다. 이 논문은 다른 포스트소비에트 및 동위권 국가에 적용할 수 있다. 특권 계층이 점점 더 디지털화되고 소외 계층은 더 넓은 격차에 놓이게 되는 추세를 고려할 때 이를 완화하기 위한 국가 차원의 정책이 필요한 것으로 보인다.

주요 키워드: 아제르바이잔, 디지털 격차, 디지털 사용능력, ICT, 공공 서비스

학생 수: 2021-25253

Abstrakt

Dövlət Xidmətlərinin Göstərilməsində Rəqəmsal Bölgü Azərbaycanın Durumu

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Rəqəmsal mühitdə işləməyi bacaran insanlar üçün informasiya və kommunikasiya texnologiyaları çox böyük fürsətlər açır. Rəqəmsal bölgünün əks tərəfində dayanan fərdlər isə özlərini cəmiyyətin imtiyazsızlar kateqoriyasına məhkum etmiş olur. Azərbaycan Respublikasında rəqəmsallaşmanın tam sürətlə davam etdiyi bir mühitdə urban-rural əsaslı rəqəmsal bölgü prima fasi olaraq tanınsa da bölgü trendlərinin detalları əsaslı şəkildə araşdırılmayıb və bu barədə ictimaiyyətə açıqlamalar edilməyib. Bu tezisdə araşdırmaçı Azərbaycan Respublikasındakı rəqəmsal bölgünün təsir etdiyi sahələri tapmaq üçün datalara nəzər yetirir və cəmiyyətdə rəqəmsallaşma prosesinin ən çox təsir etdiyi kateqoriyaları aydınlaşdırmağa çalışır. Bu məqsəd üçün toplanmış spesifik datanın əsasında, araşdırma söhbət gedən ölkənin paytaxtından kənar bölgələrdə dövlət xidmətlərinin göstərilməsi zamanı yaranan rəqəmsal istisna olmuş fərdlər üzrə inferensiyalar təqdim edir. Söhbət gedən ölkə cəmiyyətinin bir neçə kateqoriyasını əhatə edən çoxsaylı reqressiya təhlilli statistik analiz nəticələri tezisə araşdırma sualını tapmağı ilə sonlanmışdır. Hazırkı Azərbaycan qərarvermə mexanizmlərinin nümunələri nəzərdən keçirilmiş və rəqəmsal bağları artırmaq üçün siyasi tövsiyələr təqdim edilmişdir. Bu tezis keçmiş Sovet ölkələri və oxşar ölkələrin vəziyyətləri üçün də istifadə edilə bilər. Tezisdə rəqəmsallaşma prosesi ilə başbaşa, gələcək rəqəmsal müdafiə qanunlarının hazırlanması üçün çağırışlar edilir. Əks halda imtiyazlı seqmentin daha sürətlə rəqəmsallaşması, rəqəmsal bölgünün digər tərəfində qalan əhalinin isə daha da böyük bölgü arasında qalması trendlərdə müşahidə edilir.

Açar sözlər: Azərbaycan, rəqəmsal bölgü, rəqəmsal bilgi, İKT, dövlət xidmətləri

Tələbə nömrəsi: 2021-25253

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