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# INVESTIGATION OF UKRAINIAN PUBLIC E-SERVICES PROVISION AND CONSUMPTION IN THE CONTEXT OF E-GOVERNANCE

Master thesis

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# UKRAINA AVALIKE E-TEENUSTE PAKKUMISE JA TARBIMISE UURIMINE E-VALITSEMISE KONTEKSTIS

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## Author's declaration of originality

I hereby certify that I am the sole author of this thesis. All the used materials, references to the literature and the work of others have been referred to. This thesis has not been presented for examination anywhere else.

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## Abstract

Whole process of digitalization and development of e-governance and public e-services in particular, in transitional post-soviet countries is slow due to high level of bureaucracy and corruption, low level of transparency, public awareness and computer literacy. This thesis provides an insight why specifically e-governance mechanisms such as successful development and implementation of public e-services and a connected to them ID cards might be efficient both for citizens and government in Ukraine.

The main goal of the thesis is to find out why public e-services are not operating properly in Ukraine by employing theoretical research methodology and conducting a survey, interview and modelling a concrete public e-service in a business modeler, which could be integrated in future in a single state e-services portal. As a result of this research, the recommendation steps how to make Ukrainian public e-services operable, handy, instant, easy to comprehend and viral are offered. It should lead to future creation of unified and synchronized operable single state public e-services portal and connecting it to multifunctional ID cards with digital signatures, raising public awareness and popularization of e-governance principles.



Key words: e-governance, e-services, single state portal, public awareness, Ukraine.

This thesis is written in English and is 77 pages long, including 6 chapters, 10 figures.

**Annotatsioon**

**UKRAINA AVALIKE E-TEENUSTE PAKKUMISE JA TARBIMISE UURIMINE E-VALITSEMISE KONTEKSTIS**

Kogu e-valitsemise ja eriti avalike e-teenuste digitaliseerimise ja arendamise protsess on postsovetlikes riikides aeglane ning seda kõrge bürokraatia ja korruptsioonitaseme, vähese läbipaistvuse taseme, avaliku teadlikkuse ning arvutialaste teadlikkuse tõttu. Antud lõputöö annab ülevaate, miks just e-valitsemise mehhanismid, nagu näiteks edukas e-teenuste arendamine ja implementeerimine ning teenuste ühildamine ID-kaardiga, võiksid olla tõhusad nii Ukraina kodanikele kui ka valitsusele.

Lõputöö peamiseks eesmärgiks on leida läbi teoreetilise uurimismetodoloogia, küsitluse, intervjuude ning e-teenuse modelleerimise arusaam, miks avalikud e-teenused Ukrainas ei toimi korralikult. Autor modelleerib ühe konkretes e-teenuse, mille saaks tulevikus integreerida ühtses riigi e-teenuste portaalis. Uurimistöö tulemusena esitab autor soovituslikud sammud, kuidas teha Ukraina avalikud e-teenused toimivaks, käepäraseks, koheseks, kergesti hoomatavaks ning laiaulatuslikuks. Selle tulemusel peaks tulevikus loodama ühtne, sünkroniseeritud ja toimiv riiklik avalike e-teenuste portaal, mis oleks ühendatud multifunktsionaalsete ID-kaartide ning digitaalsete allkirjadega, mis tõstaks avalikkuse teadlikkust ja populariseeriks e-valitsemise printsiipe.

Võtmesõnad: e-valitsemine, e-teenused, ühtne riigiportaal, avalikkuse teadlikkus, Ukraina

Lõputöö on kirjutatud inglise keeles ning sisaldab teksti 77 leheküljel, 6 peatükki, 10 joonist.

## List of abbreviations and terms

| | |
|---|---|
| e-governance | Electronic governance |
| e-government | Electronic government |
| e-service | Electronic service |
| e-voting | Electronic voting |
| RQ | Research question |
| EU | European Union |
| ICT | Information and Communication Technology |
| IT | Information Technology |
| eID | Electronic identification document |
| ID card | Identification card |
| e-banking | Electronic banking |
| e-cabinet | Electronic cabinet |
| e-Estonia | Electronic Estonia |
| G2B | Government to business |
| G2C | Government to citizens |
| GG | Good governance |
| NMP | New Public Management |
| UN | United Nations |
| DESI | Digital economy and society index |
| SMS | State Migration Service of Ukraine |
| BPM | Business process modeling |
| BP | Business process |
| U-LEAD | Ukraine Local Empowerment, Accountability and Development Programme |

| | |
|---|---|
| SIDA | Swedish International Development Cooperation Agency |
| EMFA | Estonian Ministry of Foreign Affair |
| CMU | Cabinet of Ministers of Ukraine |
| JSC | Joint stock company |
| eIDAS | Electronic identification and trust services for electronic transactions in the internal market regulation |
| PKI | Public key infrastructure |
| EGAP | e-Government for accountability and participation |
| USB | Universal serial bus |
| OSI | Online service index |
| EGDI | E-government development index |
| OECD | Organization for Economic cooperation and Development |
| Wi-Fi | Wireless fidelity |

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# 1 Introduction

Nowadays e-governance penetrates on a large scale into everyday life of the society very promptly, given that is one of the efficient ways of state governance. E-governance involves different stakeholders as: government, entrepreneurs and citizens who interact with one another in a simplified, timeline and convenient way which result in more effective cooperation. E-governance reduces costs, whilst promoting economic development, increasing transparency in government, improving service delivery and public administration, and facilitating the advancement of an information society. *(Satyabrata Dash, 2016)*

Moreover, e-governance mechanisms are extremely beneficial to transitional countries as Ukraine in order to diminish corruption level in public sector by automating and digitalizing working environment between the public official and the citizen and lower their physical contact on spot. E-governance aims to reduce the number of paper documents workflow, by avoiding unnecessary bureaucratic procedures and cutting number of excessive staff and depriving citizens and entrepreneurs of bureaucratic arbitrariness in order to avoid errors and repeated collection of documents for various state authorities. It also facilitates cutting time of transactions between official authorities and citizens and eventually saves taxpayer's money. Gradually e-governance mechanisms determine the state itself to carry out obligations of increasing transparency and accountability level as well as developing principles of e-democracy and citizen's participation and data accessibility scales that raise people's trust to government.

Possibility of obtaining a public service online just in few clicks without necessity of attending the public authority is another significant benefit of e-governance. Public e-services should be easy accessible, operable, universal, affordable, oriented towards customer support and prompt service delivery. As it has become more complex to satisfy citizen's needs in a traditional paper-based way, e-services are called to simplify the bureaucracy and optimize both officials and customers time. ICT is used by the government to reduce cost and minimize time expenses during the execution of public services. *(Anthopoulos L.G., 2007)*

"One stop shop" provides concentration of different public services on a single portal online that economizes both customers and public servant's time and raises efficiency in paperless workload.

However successful provision of e-services cannot be implemented without citizen's eID mechanisms. Thus a citizen cannot obtain the whole specter of public e-services without having an identification card, which serves as a connecting middleman between the citizen and e-government. A successful Estonian case of unified identification cards and connected public e-services proves that e-governance is operable and applicable in both citizens and government everyday life. Estonian ID cards are multifunctional and handy in use. They serve as an identification document when traveling and logging in bank and public e-services portal, digitally signing documents, voting online, as a proof of national health insurance and a valid transport ticket.

Currently Ukraine faces political and technological changes which catalyze the need to catch up with other European states and provide efficient governmental reforms in order to build a modern democratic society. Howbeit such negative factors as economic and political crisis, high inflation, bribery and unemployment rates are evidence of the public administration's inefficiency and the need of modernization, especially in the context of European integration. It is the need to reform the structure and functions of public administration, which faced many governments in late XX century which became an impetus to search for effective reforming methods with regard to ICT. Implementation of e-governance principles in Ukraine is one of the main forms of public administration reforms in the information society, due to which potential direct interaction of government with citizens is provided and new opportunities for such interaction are rendered.

In order to accelerate provision of e-governance principles the government should fully support the introduction of electronic technologies in governance; provide an environment to overcome the digital inequality and raise computer literacy among the population, to conduct trainings and educational activities so that all population layers would use public e-services and to prepare appropriate educated staff or retrain existing. As e-governance in Ukraine is still at the juvenile stage of development it is of high importance to create an integrated and effective system of synchronized and connected public e-services with a condition of personal data' total security and cyber-attacks prevention.

## 1.1 Outline of the Thesis

This thesis is about investigation of Ukrainian public e-services in the context of e-governance. It consists of six chapters. In introduction motivation for the research with a brief description of current situation of e-governance and some certain problems of public e-services provision in Ukraine is presented. The second chapter is devoted to existing body of knowledge and some related works in the scope of e-governance and public e-services; theoretical framework with such approaches as good governance, new public management and their relation to the quality of public e-services provision and consumption. There are also discussed two successful examples of public online service provision in Estonia and Austria to orientate for Ukraine. The third chapter explains the main research approaches and methods used within this thesis, namely qualitative analysis by conducting an interview with three chosen Key Certification Centers in Ukraine and a questionnaire for the citizens to evaluate their awareness on e-governance entities. Comparative analysis of literature overview based on two successful examples of e-governance implementation. As well as business process modeling is employed for modeling As-is and To-be models of a chosen public e-service (foreign passport acquisition) which shows an evident difference between the two models and emphasizes pros and cons of the To-be model. The fourth chapter discusses the current existing situation of e-governance implementation in Ukraine, responsible state authorities for e-governance development, main obstacles which hinder the progress. It is also suggested As-is and To-be models and discussed their relation to successful public e-services consumption. Lastly, there is an overview of the interview's and survey's results with relevant conclusions. The fifth chapter presents the recommendation steps regarding public e-services provision and consumption enhancement. In chapter six are given answers to main research question and two research sub questions. Additionally, possible implications for future research are discussed.

## 1.2 Motivation for the Research

Research motivation and the idea of this paper comes from author's personal negative experience after trying to use public e-services in Ukraine. The topic is relevant and actual though it needs research as currently there is no single state portal with

synchronized, operable, instant, handy and easy to comprehend public e-services. Public services in Ukraine should be transferred specifically to e-services because it will significantly simplify citizen's everyday life. Ukraine's territory is immense and the road connections are bad, using public e-services online will economize citizen's time. Centrally accepted ID cards in Ukraine are issued since January 1, 2016 but serve merely as physical identification of the citizen. Although they contain citizen's digital signature but without an open key certificate, which does not enable the citizen to digitally sign the documents. There is a need to attend one of numerous certification centers for issuing digital signatures' key certificates, sometimes even pay for the service and obtain the signature valid for definite period of time. This tangles every day communication between G2C and G2B, quality of online service provision and service consumption aggravates.

In addition, there exist a significant issue with citizen awareness in the field of e-governance and online services usage in particular. Therefore, to make public e-services work in Ukraine there should be firstly implemented basic prerequisites for its operability. Initially there is a strong need to raise computer literacy in all regions of Ukraine, starting from schools to retired people as the picture still remains by fits and starts. Estonian project Tiger Leap, for instance which facilitated primarily students and teachers at schools to be computer literate and have continuous access to Internet could be taken into consideration. *(Mägi, n.d.)* Afterwards, raising public awareness campaigns regarding usage of public e-services should be conducted all around Ukraine. Lastly, to provide both authorities and the citizens with operable card reading devices so that consumption of e-services would be smooth. All in all, thorough analysis of the above mentioned facts related to service provision and consumption in Ukraine could further serve as an additional helping tool for further research in the scope of this field which is of high importance both from the citizens, government and business perspective.

## 1.3 Research Questions

The aim of this thesis is to provide answers to the main research question and sub questions by applying diverse research methodologies, conducting survey, interview and demonstrate an As-is and To-be models of a chosen Ukrainian public e-service (foreign passport acquisition) in a business modeler. It is suggested to examine the overall research question and two proceeding research sub questions.

The meta question is:

- How to make currently public e-services work in Ukraine?

Here it is worth reasoning what is needed in order to transform public services into e-services. Why specifically e-services could be useful for Ukraine and how it would benefit the Ukrainian government and the citizens. An analysis directed on all possible obstacles and cornerstones why nowadays public e-services are not operating on a desired and efficient level would be conveyed. This concerns national ID card usage and its functionality, analysis of two existing public online services portals as well as discussion on how public awareness and maturity level of e-services affect the service provision and consumption.

- RQ 1 How to raise public awareness in order to implement e-service provision more efficiently?

At this point it is necessary to indicate firstly the existing situation with people's awareness of e-governance elements in their everyday life and their knowledgeability on public e-services in particular. Secondly, to bring to the attention possible benefits both for the citizens and government coming out when public awareness level is augmented. The results would be acknowledged in the conducted survey designed for the citizens and considered afterwards. Maturity levels of e-service provision are also discussed, namely some theoretical stage models estimating how much e-services are revealed on each stage of development are outlined as well as the maturity stage of Ukrainian public e-services.

- RQ 2 How e-identity facilitates public e-services provision?

Finding an answer to this question shows subsequent interdependence of the electronic identities and usage of public e-services and the volume of its utilization, justifies importance and promotion of national ID cards' usage and outlines its compliance with eIDAS. In order to examine this, two successful examples of public e-services implementation (Estonian and Austrian experience) are analyzed as well as investigation on Ukrainian current state of public e-service provision in particular.

# 2 Research Approaches and Methods

The following sections will envisage what kind of scientific approaches were particularly selected to conduct the research and exactly with what purpose. Taking into account that the aim of my research is to collect, analyze and interpret data in order to find out why specifically public e-services in Ukraine do not operate on a desired level there is a need to employ a certain research methodology type with a view to conduct a result-oriented research. There are couple of relevant research methodologies applicable for my paper out of which I chose qualitative and comparative analysis of literature overview based on two successful examples of e-governance implementation and business process modelling which would facilitate to answer my research problem and questions.

## 2.1 Qualitative Analysis

Qualitative research is a holistic approach that involves discovery involving unfolding model that occurs in a natural setting that enables the researcher to develop a level of detail from high involvement in the actual experiences *(Creswell, 2003)*. It is more subjective and not so exact as a quantitative research approach where initially there is no hypothesis but after employing certain qualitative research methods e.g. surveys, interviews, case studies, generalising facts and results a hypothesis arises. One identifier of a qualitative research is the social phenomenon being investigated from the participant's viewpoint *(Williams, 2007)*. When exploring the main research problem of the thesis why public e-services are not operating on a desired level there is a logical need to employ specifically qualitative analysis as the problem is complex and does not contain immediately the hypothesis, but needs observation, data collection, analysis and result interpretation after which a hypothesis is formed.

A methodology refers to choices we make about cases to study, methods of data gathering, forms of data analysis, etc., in planning and executing a research study. So our methodology defines how one will go about studying any phenomenon. Methods are specific research techniques like observation, interviewing and audio recording which

cannot be true or false but rather useful or less useful depending on their fit with the theories and methodologies being used and the hypothesis being tested and/or the research topic that is selected *(Silverman, 2005)*.

In this thesis such qualitative research methods as a survey and interviews were exercised with a view to find key problems and facts which restrain e-governance implementation in Ukraine as well as sum up and generalize findings and to come up later with a recommendation of possible solutions.

The survey among Ukrainian citizens with open ended and multiple choice question options was conducted with a purpose to examine the level of general public awareness on e-governance elements, as well as to measure citizen's frequency of public e-services consumption and their subsequent satisfaction with public e-service provision. Questions on user experience and usability, computer literacy, most popular public e-services and their main channels of delivery provide with an overall clear picture for assessment of service provision, user's feedback and satisfaction and e-governance popularity.

The interviews with three chosen Key Certification Centres in Ukraine were carried out in order to better understand the role and value of the above mentioned authorities, what services they provide with, what day to day difficulties and possible barriers they encounter and what is their popularity among the public e-service users. Obtained open ended answers to such questions give an opportunity to realize what facts brake successful e-service provision in Ukraine from the view point of governmental subunits, what possible changes might be implemented and later used in recommendation. Both survey and interviews results are discussed in Chapter 4 and presented in Annex 1 and 2.

## 2.2 Business Process Modelling

Business process modeling (BPM) is the discipline of defining and outlining business practices, processes, information flows, data stores and systems. Its purpose is to find ways of optimization of the enterprises' activity. The description of business processes is carried out with the purpose of their further analysis and reorganization. The purpose of reorganization can be introduction of an information system, reducing costs, improving the quality of customer service, creating job descriptions and instructions, etc. Because of the fact that business processes are automated it facilitates obtaining higher

profit *(Sparx systems, n.d.)* BPM is not only used in business but in e-governance field too when e.g. modelling public services by designing the processes and communication between the citizen and government which simplifies whole process of obtaining a service.

In this thesis where it is needed to model a concrete one of most popular at the moment public e-service in Ukraine, BPM becomes very handy. The service of foreign passport acquisition by Ukrainian citizens has become significantly in demand especially in light of the upcoming in June 2017 visa free regime between Ukraine and Schengen Area countries. Thus there is a strong necessity to optimize this service delivery by creating and describing an As-is and To-be models in bizagi modeller which is demonstrated in subchapter 4.4. As-is model shows actual bureaucratic procedure for citizens which is time and resource consuming, while To-be model is called to simplify the service consumption and automate it by reducing tasks both for citizens and government which results in more qualitative service provision and client's satisfaction even though BP minuses are outlined as well.

As a result, the chosen qualitative methods were effectively applied in conducting thesis research and facilitated finding out answers to main research problem and questions in Chapter 4.

# 3 Overview

In the following chapter is discussed firstly some related works in the field of e-governance and public e-services in particular and their relation to this paper with a view to be aware of why specifically public e-services could be beneficial for Ukrainian citizens and applicable in their everyday life. Secondly it is envisaged theoretical framework with such approaches as good governance and new public management and their relation to the quality of public e-services delivery and consumption. Lastly two successful experiences of e-governance implementation in Estonia and Austria to orientate for Ukraine are analyzed.

## 3.1 Existing Body of Knowledge

To realize the essence of public e-services it is worth at first to understand that this term comes firstly from a service. Initially word 'service' came from the Latin word "servitium", meaning 'slavery'. Today, its meaning is no longer associated with 'slavery', instead it can refer to e.g., (1) the action or process of serving, (2) an act of assistance, and (3) a system supplying a public need *(Lindgren & Jansson, 2013)*

Service is a product of labor produced for exchange and able to satisfy human needs, its peculiar feature is that nothing material is usually produced but at the same time, the quality of existing objects can be improved. Services are intangible but sometimes they are difficult to identify because they are tightly associated with goods. But goods are aimed to be produced, manufactured, stored, transported, marketed and sold and their nature is tangible. In services ownership is not transferred, involvement of customer is needed, quality varies, evaluation becomes tougher, inventories are absent, time is of great importance because services should be provided with no delay *(Bhasin, 2017).*

If to compare the services provided by private companies or public sector it's worth noting that private sector is oriented more toward the client and cares more about the feedback, they are more dynamic and efficient. While services provided by public sector are slower but more result-oriented and include a more democratic decision-

making procedure. Often is witnessed successful interaction practice of providing public services by private sector companies *(Sirendi, 2016)*. Like in cases with state post-delivery, usually it is operated by private companies e.g. Omniva, which is an international company but still services a share of market by delivering Estonian post. Another example of delivering public services by private companies could be VFS global an international outsourcing company servicing different governments visa and passport related issues. In such a way such practice becomes mutually beneficial as government is not consuming time, budget and resources on providing directly services in a certain sector but engages private companies to be a middle man between the government and the citizen, to gather and structure all needed information and redirect it to the public authority.

Thus, developed public sector in terms of service orientation results in state economics efficiency increase. Efficient interaction of private and public sectors becomes apparent. Profit growth from the private companies is transferred via taxation and other revenues to the state budget, which increases primarily public services for the citizens and in its turn contributes to bigger economic efficiency, where private sector is a strong foundation.

In this line of research, services are contrasted to goods and are said to have three well-documented characteristics; (1) intangibility, (2) inseparability, and (3) heterogeneity *(Parasuraman, A., Zeithaml, V. A., & Berry, L. L., 1985)*. In fact, services are intangible as it is impossible to know beforehand the result and its quality. When the customer obtains the service he has to believe the service provider straight away without using it as it is not a good which is visible. Inseparability of services with the service provider lies in the fundamental connection to the later, because a service cannot be provided by itself. Hence the customer obtains a public e-service with the consent of the government, which enables the state to be a service provider monopolist and affect the user by dictating its conditions and lobbying its interests. Lastly, heterogeneity results in impossibility for the service provider to render services constantly on a high level. Therefore, the feedback mechanisms with user centric approach might help preserve client's satisfaction and loyalty.

In order to realize the importance of service orientation and its provision in the public sector it is worth to be aware of what a public e-service in its essence is.

A public service is a service provided by a certain government within its jurisdiction and tends to be the most common interface between the state and its people.

Public services should be easy accessible, operable, universal, affordable, oriented towards customer support and prompt service delivery. As it has become more complex to satisfy citizen's needs in a traditional paper-based way, e-services are called to simplify the bureaucracy and optimize both officials and customers time *(Open Government Guide, n.d.).* The aim of public e-services is to reorganize the work process of public authorities in such a way that efficient, prompt and timeline communication and cooperation between government, citizens and entrepreneurs on a new qualified level would become the basis.

In the e-government context, e-services typically deal with intangible goods such as exchange of information in order to receive permits, disbursements, register tax or similar *(Lindgren & Jansson, 2013).* So to make client use e-services its interface should be at least attracting, operable and eye catching, user centricity should be preserved as well as easiness of use which results in subsequent good usability.

When public e-services are delivered to its customers such vital aspect as service design should be implemented. If service design is not user friendly the level of service consumption will decrease. When addressing client's needs it is necessary to ensure that service interfaces are useful, usable and desirable from the client's point of view and effective, efficient and distinctive from the supplier's point of view *(Kuure, E., Miettinen, S., 2013).* Following such prompt approach is a precondition to successful service provision. The innovative design methods used in service design enable user participation in service development *(Thomas, 2008).* As it is possible to obtain later user's feedback after service consumption and subsequently redesign the service in accordance with user's tastes and needs. This is one of the reasons why service design increasingly plays a larger role in the public sector *(Rytilahti P., Miettinen S., Vuontisjärvi HR., 2015)* As it augments the quality of service provision by addressing directly the user needs and experience, hence the loyalty of users toward the service provider raises and the government's image of successful service provider raises. Simultaneously it helps to detect on what stage of the service consumption user is not satisfied and to correct the mistake by redesigning a service.

Flexibility is a hallmark of an e-service *(Bitner, Mary Jo, Stephen W. Brown, and Matthew L. Meuter, 2000).* This makes possible very easily to assess the potential users, mark their needs and change the service provision according to client's taste and demands. Further, because e-services are stored as an algorithms *(Hahn, Jungpil and Robert Kauffman, J., 2002*), there is flexibility in how they are "inventoried" and in the

ability to manipulate and transform them in various ways *(Charles F. Hofacker, Ronald E. Goldsmith, Eileen Bridges and Esther Swilley, 2007).* The above mentioned drives to the conclusion that such dimensions as flexibility in usage and convenience of e-services, makes them viral for receptive customers who are eager to interact with e-service processes and measure their satisfaction and awareness level in accordance with a rendered service.

## 3.2 Theoretical Framework

If we take into account theoretical component of service provision and consumption, it can be assumed that the object for rendering public services is the service itself as its development and provision creates conditions and ensures the needs of citizens in governance. Services entities are considered to be physical and legal entities that interact between each other to ensure personal needs and public interests. Thus, entities for providing public services are recipients or users and producers of government services. Such interpretation makes it possible to map the logical sequence of service provision: service production, service provision, service receipt and service quality evaluation.

Hence, it is worth mentioning that when the state renders public services to its citizens, custody of human rights and freedoms should be essential in the relations between the state, its public servants and individuals. The state should serve its citizens in the best convenient way. The government should guarantee every person the right to a fair impartial resolution of his/her issue in a reasonable period of time, with preservation of individuals rights, easy access to the personal case by the citizen and prompt feedback mechanisms. Each state should orientate on the best used universal practices in public service provision. In this regard it is worth turning to such approaches as Good governance and New public management.

Good governance (GG) is called to meet the needs of citizens in same way by rendering updated, instant, accessible, operable public e-services which can be used via e-identity levels, e-signatures and raise awareness of people by offering an open and direct dialogue with government as a public e-service provider. GG encourages the public trust and participation that enables services to improve; bad governance fosters the low morale and adversarial relationships that lead to poor performance or even, ultimately, to dysfunctional organizations *(The Independent Commission on good*

*governance in public services, 2004).* Thus, GG approach is very applicable for the present paper as it outlines main preconditions for service provision, such as public awareness, engagement in decision making and trust to the government. Hence, there should be discussed GG main principles which comprise: focusing on the organization's purpose and on outcomes for citizens and service users; performing effectively in clearly defined functions and roles; promoting values for the whole organization and demonstrating the values of good governance through behavior; taking informed, transparent decisions and managing risk; developing the capacity and capability of the governing body to be effective; engaging stakeholders and making accountability real *(The Independent Commission on good governance in public services, 2004).* The GG standards are worth orientating on when a certain state is going to model, design, produce and then render public services. Consequently, when users consume governmental services and provide with appropriate feedback mechanisms it becomes easy to estimate the quality of service delivery and how efficiently the GG principles were executed.

New public management (NPM) is as an efficient mean to raise e-identity and e-democracy aspects of service provision. The later becomes modernized, grants citizens with broader more access to public services, timely executed, and customer responsive. E-identity ensures a smooth process of service provision by preserving privacy issues, security and instant access by citizens as well as raises e-participation level.

NPM is called to provide with a new governance approach aimed at power decentralization, autonomy expansion of subordinated structures, bureaucracy decrease and user centricity and decision making acceleration. The governance should involve decrease of government's managerial control and raising degree of accountability to the citizens and responsibility. It is important to have a synergy between the government and society in order to meet the people's requirements. Three strategic outside-orientations are widely mentioned: market-orientation (commodification of services under the slogan of 'value for money'); stakeholder-orientation (meeting the objectives and policies particular of strong and influential external stakeholders); and customer-orientation (service delivery from a customer's perspective) *(Diefenbach, T., 2009).* This is particularly actual when forming service provision, as services should be market oriented, competent, innovative and aligned to the customer needs.

When analyzing work by Peter Schroeder on implementation of NPM principles in Ukraine it could be concluded that perspectives are vague and weak because firstly

Ukraine's State service does not always correspond to professional management requirements on all rank positions and hence there is a need to cut the amount of public servants. Secondly its state governance more standardizes citizen's lives instead of focusing on demanded qualitative service delivery. Lastly the corruption factor and lack of needed flexible administrative legislative base in this field also retards NPM development. But simultaneously there exist a strong need to implement NPM mechanisms as range of citizens are already in need of prompt, timeline public service provision and introduction of result oriented administrative activities. *(Schroeder, P., 2016)*

As a result, I acknowledge for my countries' development a strong need of conducting reforms in e-governance field related to e-identity, public e-service provision and raising public awareness. In this regard principles of GG and NPM by diminishing bureaucracy level, decentralizing governance, making it more transparent and accountable to citizens and raising public participation and e-democracy level would be beneficial. The aim of e-governance is to bring administrative services near to citizens and businesses, involves citizen and stakeholder to participation in planning and decisions making processes, improve mutual information communication through ICT, and enhance democratic processes at all; this means that in theoretical aspect the e-governance is a form of the "good management" *(Tsankova, n.d.)* .

## 3.3 Examples of Successful Public e-services Implementation

In order to develop and implement public e-services in Ukraine successfully, there is a strong need to know the background of successful examples of online public services in other European states. I chose to analyze Estonian case, as Estonia has been a pioneer in e-governance in Europe and its history, political and economic situations have a lot in common with Ukraine. Additionally, it is discussed Austrian case of eID's and how are public e-services functioning there. These two examples also justify why e-identity is a base both for public e-services provision and consumption.

### 3.3.1 Estonian Experience

Estonian ID cards were issued by the government since 2002 and serve as main identification document both national and for traveling abroad and are mandatory. Moreover, eID's are used as a single point entry to all rendered public e-services, as one

of identification means when logging in one's bank account, for digitally signing documents, as a National health insurance, single ticket for public transport (in Tallinn and Tartu only), for i-voting, as a client's card for some shops and pharmacies. Highly secured eID's have two pin codes, for citizen's authentication and for digitally signing documents. The mobile ID's were introduced in 2007 and since that time went viral and extremely handy in use as with a Mobile ID sim card one doesn't need to employ a laptop and a card reader for eID.

Another innovative step made by the government in order to be an e-state was introduction of e-residency cards for non-residents in 2014 which enabled to conduct business for foreigners (establish their company within a day, remotely digitally sign documents, file their tax declarations) being anywhere in the world and having internet access.

In Digital agenda 2020 for Estonia and Information Society is stipulated that usage and advantages of public e-services is an impetus to gain paperless interactions between the citizens, entrepreneurs (consumers) and government (public service provider) and facilitates time and money economization *(Ministry of Economic Affairs and Communications, n.d.).* This enables standardization of public e-services provision with a view to augment user's satisfaction and to align which services are not in demand. Additionally, it facilitates raising people's awareness of e-Estonia and possible cyber security threats, their knowledge and skills in ICT infrastructure and results in smarter e-governance.

Estonian public service system can be characterised as an open, post-based system – it is possible to enter the public service at every level, including the highest, as management of human resources is decentralised *(Public service, n.d.)* Such service system facilitates high accessibility and easiness in use for citizens.

Single state portal for public online services (eesti.ee), created in 2003, serves as a one stop shop for users and creates a single entry to all governmental e-services for citizens, business and non-residents having a temporary or permanent residence permits which is a similar to national ID chipped and pined identity document. The portal is easy in use, in Estonian, English and Russian with a user friendly interface and personal cabinet, sections for citizens, entrepreneurs and officials and a section offering all range of governmental e-services from different institutions from A-Z.

According to the state portal in 2014, 815 e-services were rendered among which the most popular were: My data, Admission into educational institutions (SAIS), Adding data on the certificate of temporary incapacity for work, Prescriptions.

According to European Commission, the impact of the secure state-based eID and e-signature has enabled Estonia to become one of the most digitally-savvy countries in the world and, therefore, the impact has been enormous. Digital economy and society index (DESI) indicates that "Estonia has been at the forefront of online public services for a few years is the best performing country in Europe in 2016. Estonian internet users are well-versed in the variety of online activities available to them. They are at the forefront of Internet use in Europe in areas like online banking (91%) and the consumption of news content (91%)" (*European Commission, 2017*)

The reasons why Estonia is an e-state and doing so well in e-governance implementation on the whole and public online service provision in particular are firstly centrally accepted, mandatory and multi-functional national identity card connected to the single state online service portal, where the user can obtain a service within a few clicks and a significant work with public awareness. By starting in long ago 1996 with a project Tiger Leap Foundation, which supported ICT in schools, in 2001 the Project Look@world starts to build 500 Public Internet access points, in 2002 the same project launched computer usage courses for 10% of adult population, from 2006-2014 secure internet behavior via arvutikaitse.ee was presented, from 2009-2011 project "Come along" was launched and helped 100 000 people to obtain help and advice for using internet and e-services, starting from 2012 different smart labs were created in a view to support and promote IT related activities for youth, to improve IT awareness and popularize IT as a studying field, finally from 2013-2017 Estonian smart device security project "Nutikaitse 2017" was employed aiming to raise security awareness of users regarding usage of mobile devices and e-services in a secure way. *(Pedak, 2016)*

### 3.3.2 Austrian Experience

The Platform Digital Austria (PDÖ), being the coordination and strategy committee of the Federal Government for e-government in Austria, has formulated the principles for a continued fruitful cooperation in the field of e-government, which are included in the

short document e-government Vision 2020'. Establishing eID as a key enabler and advancing the inclusion with innovative public services, are among the priorities of the Austrian e-government strategy *(European Commission, 2016)*

In Austria there is no obligatory personal ID card but in order to use public e-services there is a Citizen's ID card (CC card) which is highly consumed and introduced since 2005 together with mobile ID version *(Aichholzer, 2010).* According to Digital Austria, the CC combines two basic functions: user's verification and authentication and possibility to digitally sign documents. CC is widely used for signing documentation and encrypting personal data. The card is PINed with a high security level in order to avoid personal breach and unauthorized access.

Electronic identification scheme is based on a system of generating secure 'sector specific' digital certificates for different e-government applications. *(IDABC, 2005*)

Another version of CC is the Mobile Phone Signature which allows the citizens to easily provide evidence of their identity on the web and digitally sign documents. These signatures are legally equivalent to handwritten signatures. *(Buergerkarte, n.d.)*

Citizens can use these cards in order to obtain a wide range of e-government and e-commerce services and tasks, including online tax declaration, child allowance application, student allowance application, a digitally signed criminal record, e-public service newsletters, authentication of documents, logon to Web services and e-signatures on contracts. *(Nixon, 2010)*

There are numerous service portals in Austria among which **Help platform (Help.gv.at)** that links citizens to various online public services is the handiest in use and popular *(European Commission, 2016).*

According to European Commission and Member States 20 basic public services for Austrian citizens were identified in 2015. The top 12 the three most demanded are: Income taxes: declaration, notification of assessment, Job search services by labour offices, Social security benefits.

Austria ranks 10th in DESI 2017, unchanged from the year before. It has made progress in line with the EU average in most dimensions. In digital public services, where Austria scores particularly well, it is now among Europe's top 5. The use of Internet services is somewhat less advanced. *(European Commission, 2017)*

The digitalization of public services has a huge potential as it saves cost, time and effort for users and providers alike. Austria seems to have recognized this potential and is above average for general indicators for the use of online services. It even shows

significant year-on-year improvement, e.g. when it comes to Online Service Completion. *(European Commission, 2017).* In 2015 online service completion rate was 98 out of 100 and 90 in 2014 as compared to EU average.

According to United Nations e-government survey 2016 Austria ranked 14 and Estonia 22 among 50 main performers in e-participation index, among top performing countries in online service index Austria ranked 11 while Estonia 13. These European countries have very high level e-government development indexes and showed great progress in e-government components indexes in 2016. Therefore, it is noteworthy to conclude that with operable, handy in use centrally accepted eID's like in Austria and Estonia along with single governmental public online services portals connected to eID's which offer most of functioning services for citizens, business and foreigners the quality and level of e-governance implementation and consumption raises together with people's awareness, their trust to their governments, hence governments transparency and accountability to their nationals augments as well.

# 4 Domain Analysis

This chapter provides with an overview of current existing situation in e-governance field in Ukraine, main responsible governmental authority for e-governance implementation, description of National eID's and main portals for e-services, main obstacles and barriers in public e-service provision, level of public awareness and engagement. The results and findings of conducted survey for citizens and interviews with three chosen Key Certification Centres are also discussed. The technical part with As-is and To-be models for a chosen public e-service of citizen's foreign passport acquisition is modelled. Finally, the answers to main research problem and questions are found and explained below.

## 4.1 Overview of Current e-Governance Situation in Ukraine

Currently in Ukraine especially after Euromaidan events, situation with e-governance development and implementation has been step-by step improving. The government itself declared planning and implementing e-governance principles as a national strategy. As well as some EU funded projects by SIDA and EMFA like "E-governance support to Ukraine", "Assistance for the Ukraine Government for capacity building to develop the electronic government" and others jointly executed by Estonian (eGA) and other e-government experts contributed a lot in improving the provision of services to citizens as well as enhancing government efficiency, transparency and openness. Another important project directly targeted for improvement of public service delivery in the Ukrainian local governments by developing and implementing comprehensive and efficient ICT architecture, information systems and administrative services is "U-Lead support project eGov4Ukraine" which will last till 2020 *(eGA, n.d.)*. Apart from that some important attempts by Ukrainian government in legislative field and consequently execution on ministerial level have been carried out.

The Ukrainian Cabinet of Ministers (CMU) decree on approving the concept of Ukrainian e-services system development as of 2016 came into force and is foreseen till 2020 *(CMU, 2016)*. Consequently, single state portal of administrative services (Poslugy.gov.ua) was launched by Ministry of economic development and trade of

Ukraine, yet it provides at the moment the e-services only in the scope of economic affairs.

The CMU provision on Open Data came into force in 2015 with subsequent launch of Single state web portal of open data (Data.gov.ua) where state authorities published their data. This was an important step towards citizens' access to public information and making government's work more accountable and data more transparent. Law on citizen's electronic petition to the President of Ukraine, Verkhovna Rada (Parliament), Cabinet of Ministers (government) and local authorities was passed in 2015 and as a result it became possible to make a petition on each of the above mentioned authorities web sites. In this regard an e-petition is an important instrument to influence acting power and a way to engage people in decision making.

According to CMU decree in 2014 the main responsible authority for e-governance implementation is State Agency for e-governance in Ukraine. Its main task is realization of state policy in the field of information, e-governance, development and use of national electronic information resources, development of information society (*State Agency for e-governance in Ukraine, 2014)*

In 2015 Ukraine's Digital Agenda till 2020 was represented by The Economic Development and Trade Ministry, which outlines main principles on how Ukraine should develop the state policy in the field of information technologies, e-governance and the use of national electronic information resources. It shaped main pillars of Ukraine's digital development: e-market, digital society, telecom and ICT infrastructure, digital governance, innovations and R&D. Also the Agenda stipulated why specifically digitalization is of immense importance to Ukrainian economics Digital Agenda brings benefits for citizens by enabling their usage of ICT, public e-services, simplifying entrepreneurial activities, enhancing IT's security standards. It also upgrades governmental activity by replacing paper workload with e-documents workflow, raises transparency and accountability *(Ukrainian Ministry of economic development and trade, 2015)* .

The Green and White papers on e-governance in Ukraine were prepared in 2014 and 2015 respectively. The Green paper is called to analyze problems of e-government in Ukraine and suggest proposals for their solution as well as to define the main directions of e-government development such as electronic interaction with public authorities, e-services, open data and e-democracy (*eGA, n.d.*). The four White papers are follow up to the Green paper and outline in a more concrete way provisions of e-interaction, e-services, e-identity, e-democracy and as a result contribute to the e-governance functioning. The

main purpose is creating an e-identity infrastructure, which would enable citizens a free access to information and online services from different sources reducing risk of personal data theft or fraud, with a low probability of losing access to critical important services and data without necessity to manage multiple accounts and passwords *(Potiy O., Kozlov Y., 2015).*

In 2016 a law on internal biometric passports in the form of biometric IDs came into force. The eID's contain an electronic chip where are placed fingerprints in digitized form, but the fingerprints will be recorded only at the request of the card holder. Also on the chip in the ID-card is recorded the digital signature of the citizen *(Ukrianian Ministry of Interior , 2016).* Even though they serve more as a physical identification document, issuance of National ID cards is an important pre-condition of future e-services consumption and i-voting.

Paperless management is a foundation of e-governance, as it is a way of providing better services to citizens and making the day-to-day work in local governments more efficient *(Pappel, 2014).* Ukrainian government started implementing electronic paperless documentation exchange in 2016. As a result, level of e-interaction between public authorities raised, significant funds have been saved as well as the efficiency and timeliness of documentation receipt and decision making processes.

Several important online projects implemented by a successful interaction of civil society and governmental structures and volunteers organizations have been launched in 2016 such as Prozorro e-procurement platform which is called to replace existing paper based state- tenders and saving 22,6 bln Ukrainian hryvna *(Ukrainian Ministry of economic development and trade, n.d.).* In 2015 Portal of state services igov.or.ua was developed as an open source project by a group of IT volunteers within the framework of corruption counteractions and improving business processes in public institutions. There are compiled services that Ukrainian state authorities provide to citizens and entrepreneurs *(Portal of state services, n.d.)*

Due to such positive governmental, civil society initiatives and projects and e-governance backing in legislative field Ukraine's international ranking in e-governance indexes improved since 2014. Recent UN survey in 2016 showed that Ukraine ranked 62 in e-government development index compared to 87 position in 2014 and 32 in e-participation index in comparison to 77 position in 2014. This places Ukraine among top 50 performers in e-participation in 2016. This advance in e-participation ranking was reached due to Ukraine's e-consultation activities expand from 27% to 84% *(UN, 2016).*

## 4.2 Problems and Obstacles

But along with progress there still exist significant obstacles and barriers that hinter e-governance penetration in everyday life. This subchapter outlines the most evident existing problems in Ukraine's digitalization and its way to mature e-governance system. The first essential problem is absence of State population register, even though the Law of Ukraine on "Single state demographic register" is acting since 2012. The system of forwarding information about population number is outdated. Current population record in Ukraine is carried out by local authorities which register birth, death, marriage and divorce, people entering or departing the territory of the village or city. Information than is transferred to the district administration and to the State Statistics Committee of Ukraine, where it is processed and generalized as of January 1 of each year. Another way to record population is conducting censuses once a decade. The next all-Ukrainian census is held in 2020 by the decree of the Cabinet of Ministers of Ukraine of 9.04.2008. Also because of instable situation in the country there are many refugees, internally displaced people, immigrants which makes it even more complicated to conduct records *(All-Ukrainian population census, n.d.).* As a result, population data is incomplete, not up-to-date and stored in a chaotic way. For example, in Estonia the population register is a database which unites the main personal data on Estonian citizens (ID codes, birth dates, places of residence etc.), citizens of the European Union who have registered their residence in Estonia and aliens who have been granted a residence permit or right of residence in Estonia (*Estonian Ministry of Interior , n.d.)*. The register is connected to other systems via the X-Road, and a variety of other state systems depend on its data for their services. When individuals apply for different services, data is retrieved from the population register *(e-Estonia, n.d.)* Hence a central reliable population register is not only a base for elections but one of the e-services delivery and consumption pre-conditions. It helps to avoid data misuse as the 'once-only' principle of data collection is implemented. This facilitates national and cross border data exchange.

Next problem is both related to the above mentioned obstacle and inability of public e-services usage. It is the absence of national unique identifier, i.e. Ukrainians don't have mandatory personal identification code (e.g. 'isikukood' in Estonia). Nowadays Ukraine has an individual tax payers code of every citizen given since birth but not mandatory, a biometric foreign passport for travelling abroad where this personal code is present, an internal paper passport with a serial number, place of registration, marital status but no personal code and ID cards with microchips containing a personal code. But yet this tax payers code has nothing to do with a unique identification code of

a citizen. This strongly aggravates not only internal service provision but cross border services too. As there is no possibility to identify a Ukrainian citizen applying for a service somewhere abroad and vice versa for instance. One of the eIDAS regulation provisions is ensuring that people and businesses can use their own national electronic identification schemes (eIDs) to access public services in other EU countries where eIDs are available. As well as creation of European internal market for electronic trust services – namely electronic signatures, electronic seals, time stamp, electronic delivery service and website authentication – by ensuring that they will work across borders and have the same legal status as traditional paper based processes *(European Parliament and Council, 2014)* This drives to the conclusion that eIDAS principles are not implemented in Ukraine yet. While according to Ukrainian legislation stages of e-governance implementation are carried out according to the plan, but EU notes that Ukraine is behind in this regard. Herewith is found an answer to RQ 2 that e-identity is a technical base for e-service provision. Countries who don't have centrally accepted eIDs cannot be a successful provider of public e-services as there arise such obstacles as security and privacy issues, timeliness of obtaining a service, no two-way instant needed feedback or dialogue with public authorities. As e-identity levels influence the process of service provision, they unify and synchronize the whole process of user's application for a service and government's delivery of it. In this regard there are three assurance levels of electronic identification schemes according to eIDAS. Low, substantial and high. Assurance level low of an electronic identification provides a limited degree of confidence in the claimed or asserted identity of a person. Assurance level substantial of an electronic identification provides a substantial degree of confidence in the claimed or asserted identity of a person. Assurance level high of an electronic identification provides a higher degree of confidence in the claimed or asserted identity of a person than electronic identification means with the assurance level substantial. eIDAS is the main instrument to remove barriers for cross border trust services and strengthen positions of interoperability and mutual recognition of electronic identification schemes across borders as well as standardization issues and cryptography for e-signatures as main means of ensuring a high level security *(European Parliament and Council, 2014).* To meet the requirements of eIDAS Ukraine should first adapt its legislation toward the provisions of this regulations, develop the basis for it such as unique national identifier for Ukrainian citizens which would be equal to other cross border identities and build operable trust services. The Draft of Ukrainian law on electronic trust services is the first attempt to align Ukrainian PKI to the European requirements and facilitate cross border interaction.

For instance, the law draft already defines three levels of assurances according to eIDAS. Probably when it will come into force eventually main eIDAS provisions will be implemented in Ukraine and that will facilitate Ukrainians to use cross border services. It also is one of EU requirements for EU-Ukraine association agreement.

Another major obstacle in successful public online service provision and consumption are dysfunctional ID cards. Introduction of ID cards as an internal passport in Ukraine in 2016 has been one of visa liberalisation conditions with EU. This is a one step closer to creation of single state population register which would facilitate prompt citizen's identification. Ukrainian ID cards contain microchips, where information about the citizen is stored. It contains digitalized picture, signature and fingerprints (on consent of the citizen). As citizen's residence registration is also stored on a chip's card and not on the card's front side, it creates a major problem for citizens to get a bank loan. Ukrainian banks do not have appropriate card reading devices yet and demand presenting residence registration in an internal document when applying for a loan. The State Migration Service of Ukraine provides with a separate paper document where it attests the residence registration of the person but it is not a convenient way. Therefore, citizens are not willing so quickly to replace their paper internal passports by ID cards. Another major obstacle which makes the acting ID cards merely a physical identification document is absence of public key certificates for digital e-signatures already encrypted in ID card. Even if the digital signature of the person is already stored in ID card's chip citizens cannot digitally sign the documents and obtain public e-services. Hence Ukrainian ID cards for now at least are dysfunctional. Therefore, in order to make the system of eID work it is necessary first of all to pass a law which stipulates that ID card is the main identification document of Ukrainian citizens. Second to encrypt on ID cards both personal and public key certificates, so that users could digitally sign the documents by themselves.

This follows another obstacle in easiness of ID cards and e-services usage for citizens which is absence of central certification center. There are currently 24 registered and acting certification centers in Ukraine accredited by the Central attesting body of the Ministry of Justice of Ukraine in the registry. Some Ministries have their own subordinated accredited certification centers and some are private-owned. According to Ukrainian Law on electronic digital signature amended in 2016 the above mentioned accredited certification centres are subjects of lawful relations in the sphere of electronic digital signature service. These centres provide services of public and enhanced key certificates in order to check the validity of the user's private key certificate *(Ukrainian*

*Parliament , 2016).* The interview carried out with three chosen certification center below in subchapter 4.3.2 clearly indicates that the authorities face inner interoperability problems, namely their issued public key certificates are incompatible with one another and cannot be validated by the means of each other's e-signature. This creates a mass in their own work and also is absolutely not convenient for users. Citizens still need to consume their time and attend once a certain time the center in order to obtain the key certificate, upload relevant software on their computer and only then can digitally sign documents. In addition, the above mentioned certificates are valid during a fixed period of time. The interview also revealed that there exist a certain 'monopoly' by some certification centers in Ukraine and their support by some certain public authorities. Hence, a creation of single certification center for issuance of public key certificates would be the first worth attempt to regulate the procedure. But subsequent advanced cryptology of national ID cards with both private and public key certificates could enable people to digitally sign documents and use e-services without necessity to physically turn to authorities. This steps are necessary to be taken as they serve as pre-conditions to public e-services provision and consumption.

The absence of single state portal for public online services delivery is another vital problem and simultaneously one of the answers to the main research problem of the thesis. Public e-services in Ukraine are not operable on a satisfactory level because there is firstly no functional national ID card and secondly no unified one stop shop of public operable e-services, where people could log in with their ID cards connected to the portal and use public e-services for instance. There are currently two portals of public online services in Ukraine. One portal is a commercial and volunteer project igov.org.ua with basic online services for citizens and business within the scope of personal data, real estate, social life, vehicle registration. All specific online services such as: tax declaration, financial or legal services should be directly obtained from the responsible authority. It is possible to log in via BankID only in case if the user is a client of one of the five concrete Ukrainian banks, which becomes impossible for other client's banks. Identification via digital e-signature certificate is possible if it is obtained by the user at one of the 24 certification centers. Also the portal offers identification via ID card and MobileID, though the latter is not introduced in Ukraine yet, as well as the ID cards without public key certificate obtained at one of the certification centers are not operable. The author finds eID procedure at this portal quite problematic. Another portal poslugy.gov.ua is a single state portal for rendering administrative services subordinated to the Ministry of economic development and trade, as a result it offers only economics related services

mostly to businesses. It bears mostly informative character about the services offered to the citizens and business since it is a pilot version. As a result, online service consumption via other eID methods except for digital e-signature identification is not possible yet via this portal, the usability of the portal's interface is not easy enough to find the needed information at once. However, many Ministries offer their own structured e-services list e.g. Ministries of Justice, Interior and State fiscal service of Ukraine are the most successful in this regard. Citizens use e-signatures mostly when digitally signing tax declarations in State fiscal service of Ukraine which is one of the most popular e-services and helps avoiding queues on spot.

Maturity level of Ukrainian e-services, indexes of online service delivery rating Ukraine is another important aspect of discussion with a view to finding the answer to the main research problem, why Ukrainian public e-services don't operate on a sufficient level. According to OECD, e-government services follow different development stages with increasing sophistication: i) "push services" where information and data are made available to users; ii) "pull services" where information and data can be downloaded by users; iii) interactive services (e.g. electronic forms); iv) transactional services (e.g. full electronic case handling); and v) individualisation of services (e.g. automatic individualised information and data provision) *(OECD, 2009).* In line with this theoretical services maturity stages, in author's opinion Ukrainian e-services are mostly revealed at the first three stages of development, namely: 'push and pull services' and interactive services, the first development stage is the most common. Very few are at the transactional level (e.g. filing online tax declarations and some bank services). This tendency is due to the fact that most services are developed and delivered in a very heterogeneous way (volunteer projects, official governmental, some local in the cities of Lviv, Kyiv and Dnipro), however local level of public e-service provision is not envisaged in the given paper. Public general e-service provision is estimated on insufficient level and is quite chaotic because the services are not structured in one single state portal, synchronized with those on spot, some are outdated and not operable. The above mentioned facts affect the overall rating of online service provision.

Pursuant to UN the first stage is emerging corresponding to informative basic level of service provision, second stage is enhanced when one-way or simple two-way e-communication between government and citizen is provided, third stage is transactional when government establishes a two-way communication with their citizens, and fourth stage is connected when e-services and e-solutions cut across the departments and ministries in a seamless manner *(UN, 2012).*

According to UN survey 2016, Ukraine is grouped in a category of high OSI (between 0.50 and 0.75), its online service component equals to 0.5870 in the EGDI level. The online services component of the EGDI is a composite indicator measuring the use of ICT by governments to deliver public services at national level *(UN, 2016)*. However, such high OSI indicator and conducted survey results below in subchapter 4.3.1 are somewhat contradictive to author's evaluation of Ukrainian e-services above and are opposite to the situation which is de facto with Ukrainian e-services provision and consumption. Hence, even if OSI is according to UN and 37,3% of respondents find public e-services provision in Ukraine satisfactory, according to the survey it does not automatically mean that its delivery is successful, done in a user centric way and that its consumption is on a high level. In Ukraine, as was already stated above there is no systemic approach of rendering public e-services, it is done fragmentarily on the level of Ministries, local levels, some volunteer projects. The legislation has some provisions which exist only on paper (e.g. Law on single state demographic register) and are not executed in reality. As a result, because of the mentioned fact and country's size, government faces problems in online service delivery, conformably citizens experience inequality in public e-service consumption.

Last but not the least problem of Ukraine's e-governance integration is public awareness and engagement. People's engagement in decision making and participation in e-governance as well as usage of public e-services remains still rather low. While in UN's Agenda 2030 Goal 16.9 it's pointed out that by 2030 it's mandatory to provide legal identity for all including birth registration *(UN, 2015*). That means enhancing public engagement by creation of opportunities for the realization of personal rights, equal access to public data and services. According to EGAP, 79% of Ukrainians are not familiar with a term 'e-democracy', while other 46% deem that it is a mechanism of horizontal communication between each other and not with government. About the existence of e-petitions as an e-democracy instrument, a way of setting a problem to the government and influence the procedure of decision making is familiar only every fourth citizen *(EGAP, 2016*). Somewhat opposite statistics revealed conducted survey results among Ukrainian citizens in the following subchapter 4.3.1. In particular, survey outcomes indicated high public awareness level on main e-governance components but mostly among young educated, computer literal people. Consequently, it is of immense importance to launch official campaigns on public awareness enhancement for all age citizens comprising all regions of Ukraine. The campaigns target should be organizing workshops for citizens and explain them in a very basic language the main e-governance

components, benefits from public e-services provision (time and money economization, no need to travel anywhere, avoid queues, bureaucracy and contact with public authorities). To popularize National ID cards and specify why its usage is important by linking the person to public e-services pportal, carrying out secure transactions online, possibility of future voting online and other benefits which would dimish corruption level and increase government's transparency and accountability to its citizens. Subsequently, people's level of engagement in state governance and decision making will also encrease as the ability to take part and influence the governmental decisions will be factual. It is also worth to engage international experts from different countries with successful e-governance implementation and subsequent simplification of everyday life both for society and government. Sharing e.g. Estonian and Austrian e-governance experience among average Ukrainians would benefit a lot positive image formation of e-governance components. In the same way as it is outlined in this thesis subchapter 2.3 on successful e-services in Estonia and Austria. Estonia is such a good example for Ukraine's orientation towards better governance in an e-way because of similar past background and political events. Even though Ukrianian government set as e-governance one of National strategic goals, there are unfortunately still many objects who restrain e-governance development, such as some state authorities (not ready to switch from paper to e-format of workflow, as a result cannot integrate in the unified e-governance implementation process), church (against all kinds of smartcards with chips and numbers) and outdated legislation. These factors affect negative image of e-governance components among Ukrainians. Hereby, is answered RQ 1 "How to raise public awareness in order to implement e-service provision more efficiently?".

## 4.3 Survey and Interview's Results

### 4.3.1 Survey Outcomes

The survey for Ukrainian citizens was conducted with a view to acquire information to measure the scale of general public awareness on e-governance mechanisms. This included: public e-services provision and its channels of delivery, eID methods, e-signature meaning, most popular public e-services, their frequency of usage, services usability and subsequent user experience, interest of citizens towards governmental portals, level of computer literacy, degree of citizen's satisfaction with service provision. The survey was conducted among Ukrainian citizens in the age between 18 and 83 years in a google form format for convenience.

The first question was intended to conclude general public knowledge of different eID methods. The results show that majority are familiar with bank identification as it is the most common way to authenticate a user in Ukraine. Other methods of eID are less developed. But nevertheless almost half of respondents are familiar with ID card identification even though it is not widely used yet in Ukraine since its issuance in 2016. A bit less than half of respondents is also aware of identification via mobile phone, yet Mobile ID remains a pilot project and is not implemented yet in public. The least familiar way of eID among Ukrainians is Pin calculator, which is used in Internet banking but in Ukraine banks do not offer such option. Supposedly people wrongly have taken a pin calculator for an e-token. The chart below shows percentage of the most and least familiar eID methods among Ukrainian citizens.

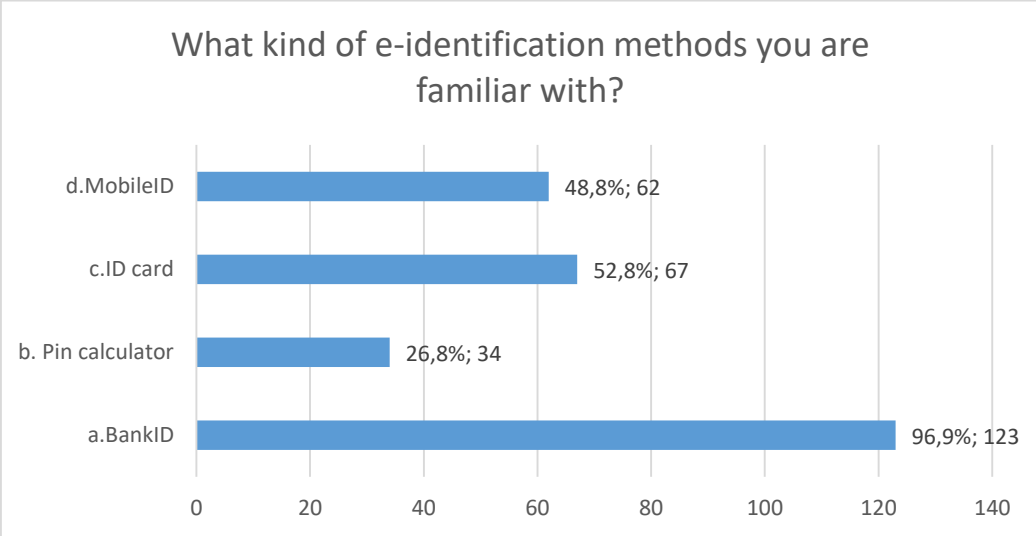


Figure 1. What kind of e-identification methods you are familiar with?

The second question purpose was to obtain information if Ukrainian citizen understand the notion of digital signature in a correct way. In such a way a range of answers was offered to respondents which were all correct except for the last one. More than half of surveyed people deem that digital signature is a signing method, while around 30% consider it to be a user authentication process, only 13% chose data authentication, and only 3% were wrong in saying that an e-signature is not legally bound. Analyzed responses show that on the whole Ukrainians are well aware of what an e-signature is which is a positive trend in public awareness regarding this specific question.

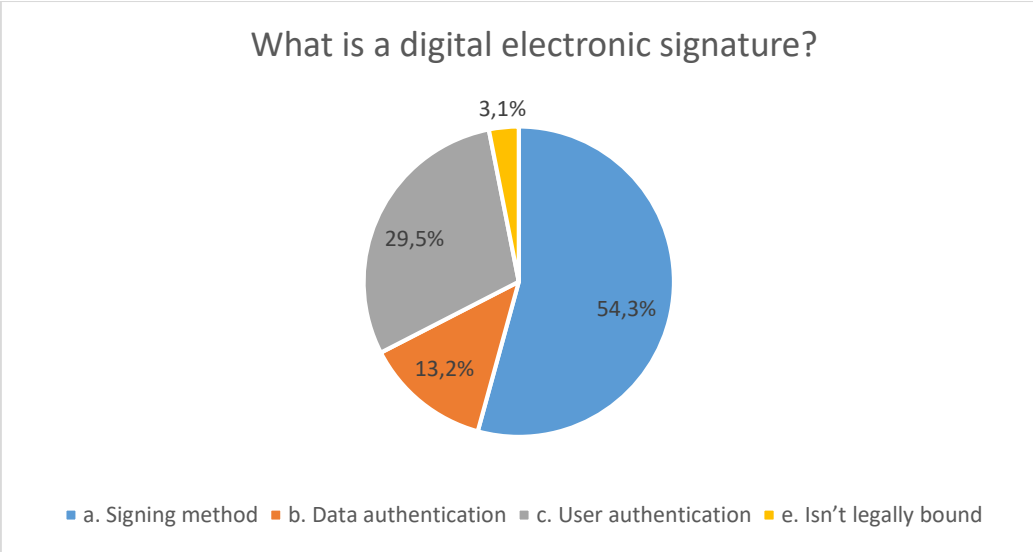


Figure 2. What is a digital electronic signature?

Third question was targeted to audience in order to find out most used e-services delivery channels. The survey indicates that almost equally people use e-mails and electronic forms e- service channels. The least are used downloads in PDF format and pre-filled forms respectively.

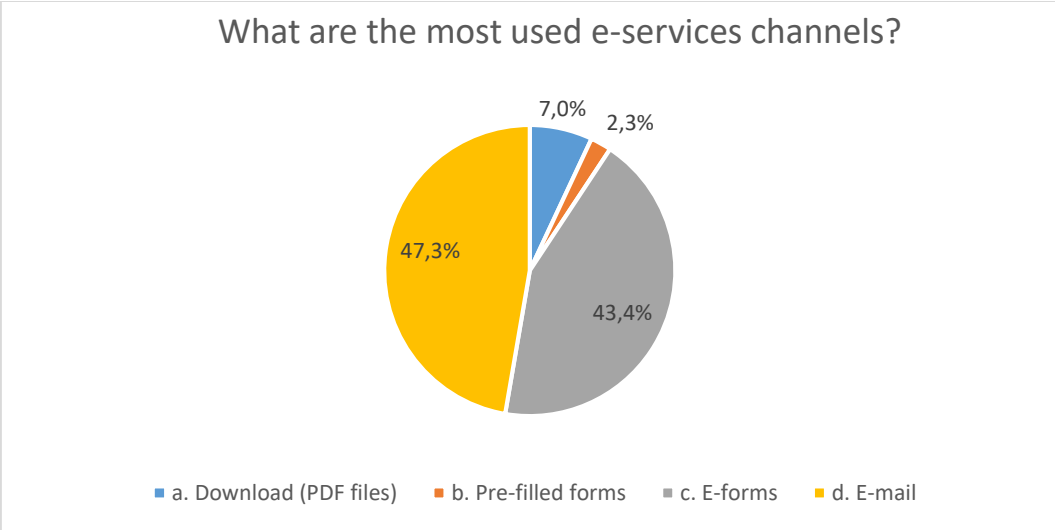


Figure 3. What are the most used e-services channels?

Fourth question was aimed to find out most popular and demanded public e-services. The results point that the most needed is an e-request for information in general, almost half of respondents fill out e-tax declarations, less popular is company registration and e-land registry excerpt. Vehicle registration and state civil registration are used only by 13% and

10,7% of people, and the least needed e-service turned out to be an e-claim to court among the surveyed people.

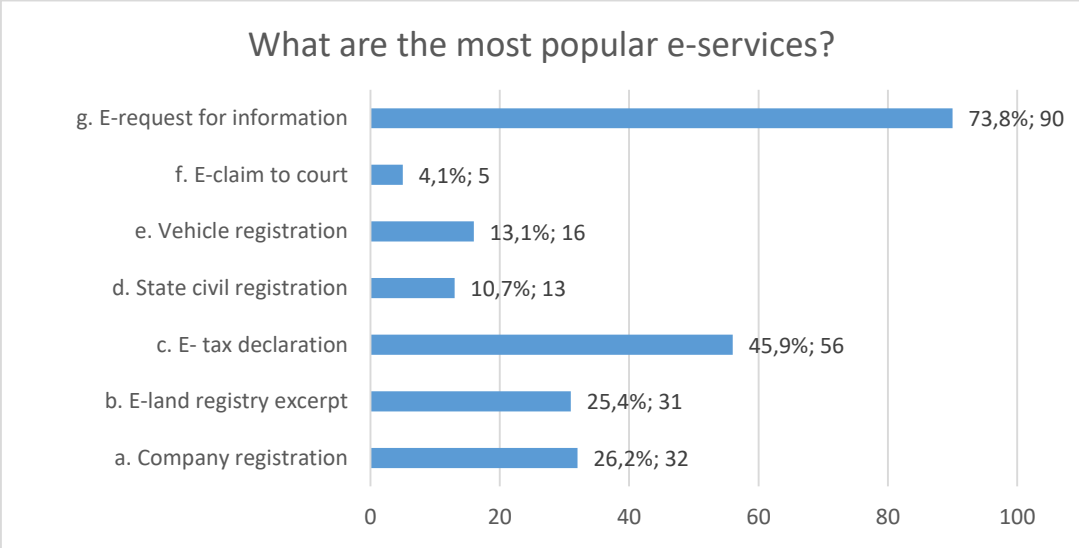


Figure 4. What are the most popular e-services?

Fifth question was asked to determine usage frequency of public e-services by Ukrainians. The chart indicates that only 36% of respondents use e-services every day on a regular base, while 26% responded that they do it once a month, once a week e-services are consumed by 17% of people. Less than 15% of respondents use e-services only once a year and almost 5% have never used rendered e-services in Ukraine. It might be summarized that there is no high frequency of public e-services usage among Ukrainian respondents but considering the fact that there is yet no single state portal for obtaining public e-services and an obstacle with digitally signing documents the results show a positive trend.

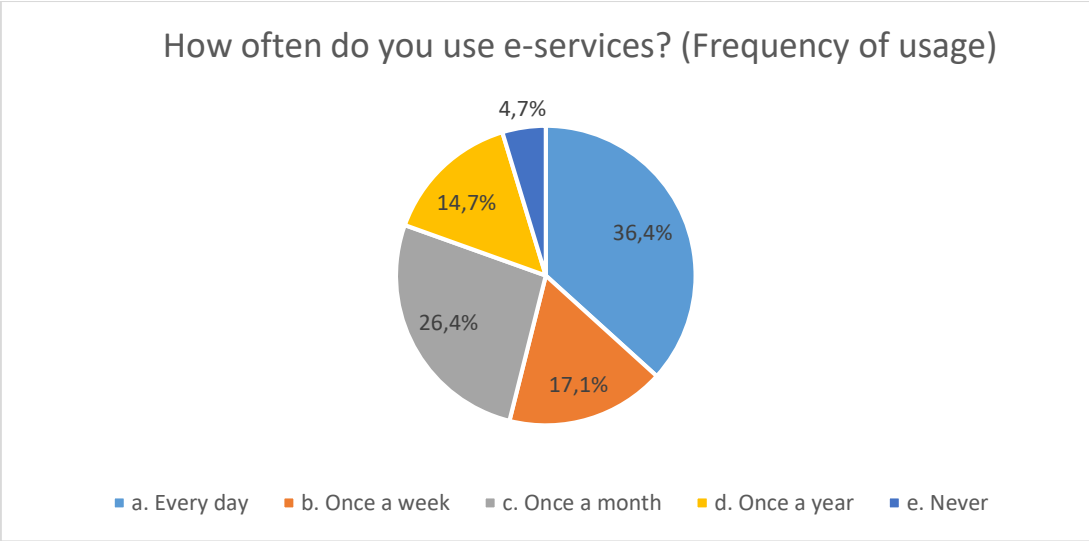


Figure 5. How often do you use e-services? (Frequency of usage)

Sixth question was intended to examine the usability of offered e-services and user experience after consumption. The chart clearly shows that it is still needed to do more than five clicks in majority of answers in order to obtain the service, while more than 30% yet replied that usability is quite satisfactory and within five clicks it is possible to obtain a service. Only 16,5% of respondents did more than ten clicks when they tried to use public services online. Overall user experience after e-service consumption is estimated as satisfactory.

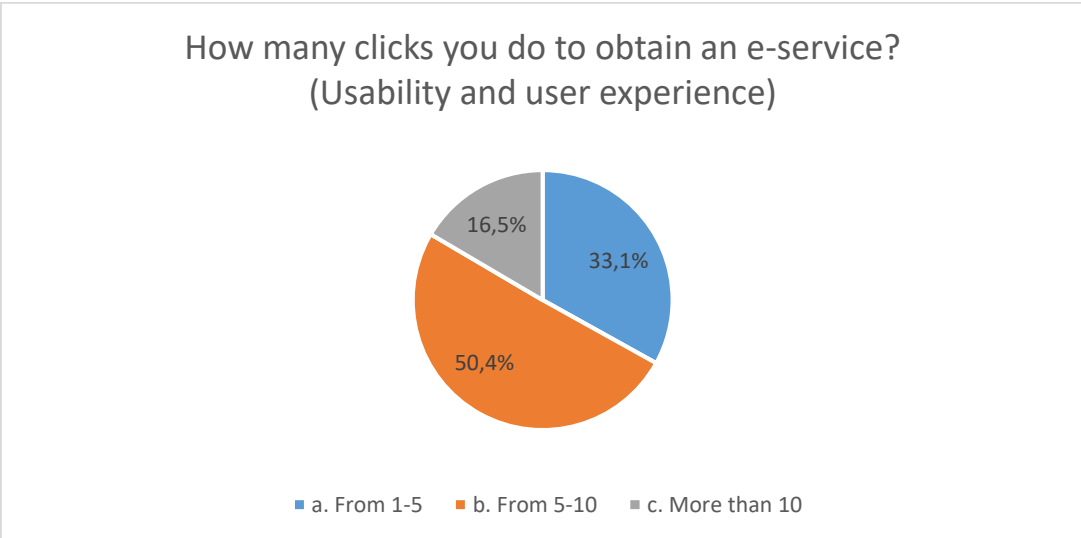


Figure 6. How many clicks you do to obtain an e-service? (Usability and user experience)

Seventh question was interrogated with a view to measure citizen's interest toward governmental portals and their frequency of visits. The results turned out to be somewhat contradictive as 34% of respondents confessed they would visit governmental portals only once a month which is very seldom, while almost 30% would still visit the official pages every day. Once a week would like to find out information on public portals only 19% of people and 3% would never visit such portals.

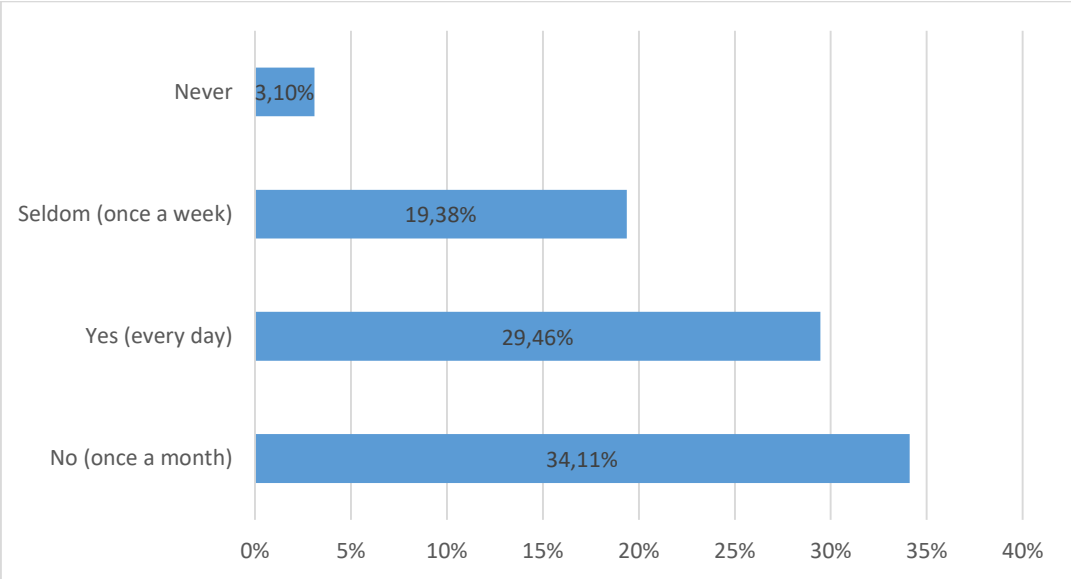


Figure 7. Do you visit often governmental portals?

Given answers to the eighth question demonstrate the level of computer literacy, people's interest and necessity to use computers. Majority of respondents replied that they would need to use computer every day, though almost 4% still use it rarely. This trend shows that computer usage is in high demand among the Ukrainians and computer literacy rises, which is a favourable pre-condition for e-governance employment among citizens.

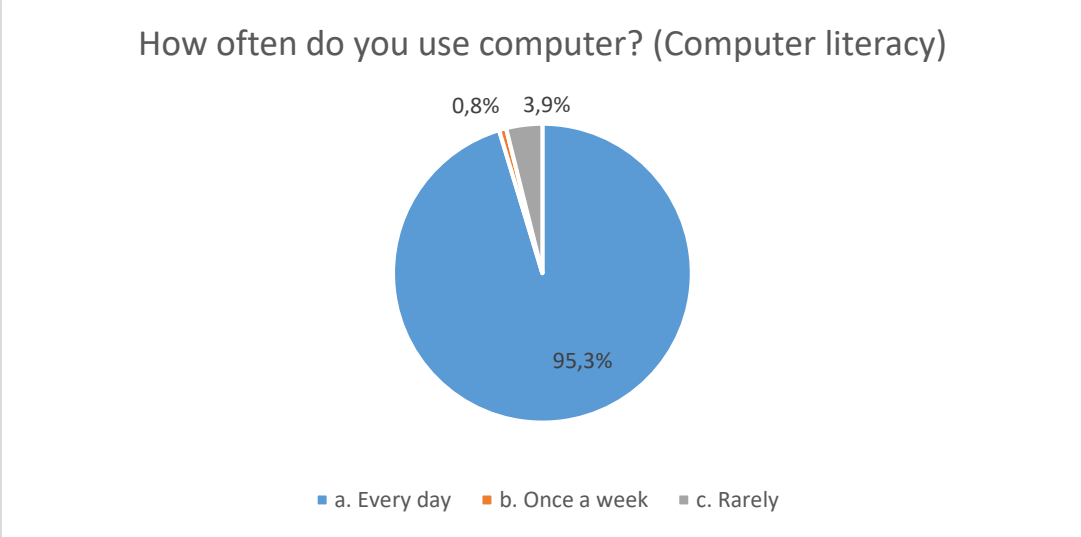


Figure 8. How often do you use computer? (Computer literacy)

Question regarding ID cards usage was selected to be asked with a view to get an overall picture of people's awareness regarding functionality of ID cards. Respondents correctly believe that ID card could be used theoretically both as an authentication method and for service receipt. But Ukrainian ID cards are not connected to single portal of online services and without getting a Key Certificate from certification centers people cannot digitally sign documents. While less than half correctly consider that Ukrainian ID card is merely a method for user authentication and only 7% deem that they could get an e-service via ID card. Answers given in the chart point that Ukrainians are positive about ID card usage and would like to have multifunctional ID cards which would simplify e-service usage.

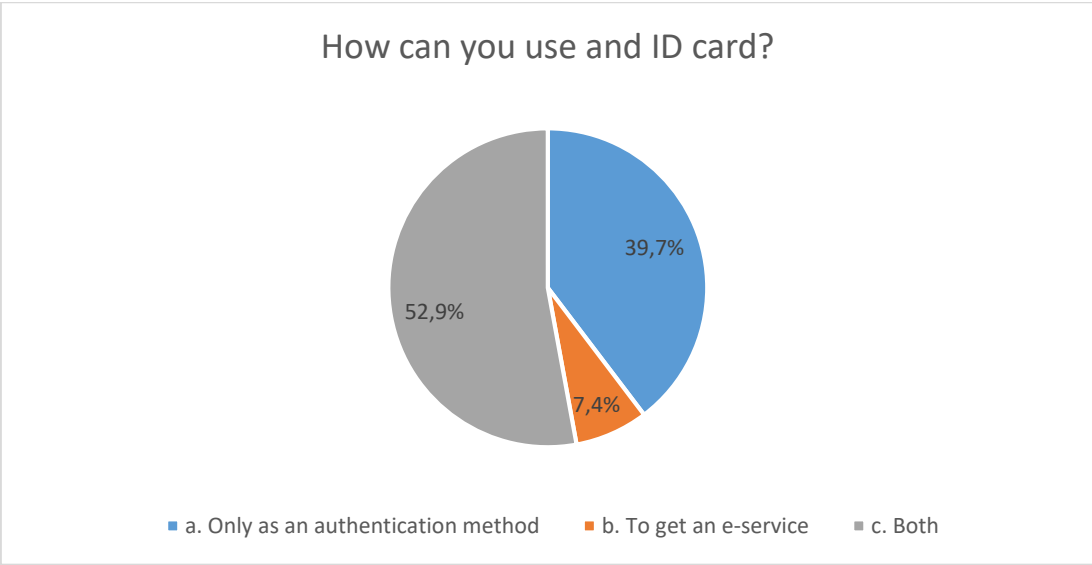

Figure 9. How can you use and ID card?

The last question outlines scope of respondent's satisfaction with public online service provision. The chart below indicates that 37% find rendered services satisfactory, while almost 30% would estimate the service provision as a good one. Yet 19% would find it non-satisfactory and almost 10% consider Ukrainian public service provision to be excellent. Less than 5% are totally not satisfied with offered services and consider them to be poor.

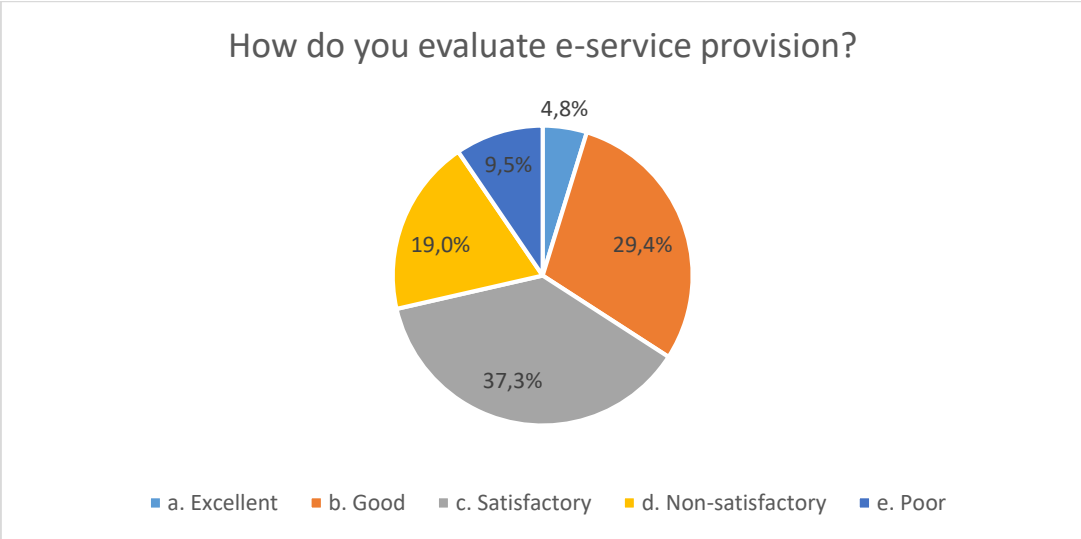


Figure 10. How do you evaluate e-service provision?

The conducted survey among Ukrainian citizens testified that respondents are predominantly aware of eID methods, e-signature and ID cards functions. They frequently use rendered public e-services via BankID, have favourite ones and on the whole are satisfied with service provision. The computer literacy is growing as well as frequency of computer usage. However, it is worth pointing out that along with public interest towards public online service consumption there are some notable obstacles that hinder e-governance penetration in people's everyday life. Firstly, absence of single state unified portal of public online services, where all range of services provided by different state authorities would be grouped, synchronized and available. The portal's interface should be user centered with good usability options, so that the user would find a proper service and obtain it within a couple of clicks and minutes. Secondly is absence of connected to the above mentioned portal ID card which would be multifunctional and bare a digital electronic signatures with key certificates on it. This would allow citizens

to obtain services promptly, timeline and without necessity to attend public authorities. Current Ukrainian ID cards cannot serve even as an authentication method as there are no appropriate devices like card readers for data access. To sum up it is worth noting that even though Ukrainian respondents are aware of e-governance mechanisms theoretical functioning and are eager to use them in order to upgrade and simplify their lives, there should be taken concrete actions to provide the citizens with such benefits.

### 4.3.2 Interview's Outcomes

Interviews with chosen three most responsive and innovative key certificate centers in Ukraine were conducted in Kiev. This is needed in order to examine what kind of problems and technical barriers public authorities responsible for e-governance implementation face in their interaction between each other and the citizens. There is currently no Single Certification Center in Ukraine which would provide validity confirmation services giving digital signature a legal basis, user-based authentication services, time stamping services and issuing qualified certificates for e-Seal like in Estonia, for instance. Moreover, Estonian Certification center developed necessary software for using ID-card, including DigiDoc software, which enables to give digital signatures, check the validity of signatures and encrypt data. *(AS Sertifitseerimiskeskus, n.d.).*

The first chosen Key Certification centre is the Accredited Key certification center of the Ministry of Interior of Ukraine. Its functions come down to maintenance of users certificates, including user's registration, public keys certification, management of information of certificate status and information distribution. Validity period of the issued key certificates by this center is 5 years *(Ukrainian Ministry of Interior, n.d.)*.

The second chosen Certification center is the Accredited Key Certification centre of the State enterprise "Ukrainian institute of intellectual property". When the service of Electronic digital signature issuance is rendered, applicant's identification and authentication take place, e-signature's private key is generated on the USB-flash drive and an public key certificate is formed which is published at the request of the applicant to the web site of the organization (*Accredited Key Certification Center of the State enterprise "Ukrainian institute of intellectual property", n.d.)*.

Third interviewed Key certification centre is the Accredited Key Certification centre of the Public JSC "National Depository of Ukraine" which was established in 2008 established and is one of the key elements of the Automated Information System of the

National Depository System of Ukraine. Its main functions come down to digital signature issuance, cryptology services and maintenance of public key certificates. Digital electronic signature allows the user to verify the integrity of the document signed and identify the user. Its status equivalents to a personal signature. Cryptographic information protection provides confidentiality of transmitted information. Maintenance of public key certificates ensures blocking, renewal, cancellation of enhanced public key certificates *(Accredited Key Certification Center of the Public JSC "National Depository of Ukraine", n.d.).*

The first interview question is “What are the difficulties with rendering digital signature for certification centres?” The Certification center of the Ministry of Interior stated that users’ poor awareness regarding e-signatures usage requirements, unwillingness to acquaint oneself with the legislation and standards in this field is the main obstacle the center comes across. While the Certification center of “Ukrainian institute of intellectual property” responded that there are no difficulties with e-signature issuance. The Certification centre of the Public JSC "National Depository of Ukraine" acknowledged that lack of personnel is the main difficulty.

The second question is “How many users are counted in certification centres?” Only of the “Ukrainian institute of intellectual property” Certification centre provided with such information. The number of users is around 500 people (physical, juridical persons, entrepreneurs) because the centre has only 3 years of working experience in this field. Other two Certification centres claimed that it is a confidential information.

The third question is “What technical problems/barriers are facing certification centres?” Ministry of Interior’s Certification centre does not face any such barriers at all. While “Ukrainian institute of intellectual property” Certification centre stated that today’s problem is that software developers use the key formats only by some 'certain' certification centres. While it is necessary to provide access to software to all accredited certification centres that currently are in a trust list (registry) of the Central attesting body of the Ministry of Justice of Ukraine (http://czo.gov.ua/ca-registry), whose validity is acting and no matter which format of key certificates they use. "National Depository of Ukraine" Certification centre also confirmed that Ukrainian software developers cannot use international standards for Ukrainian users. Hence it may be pointed out that this is a common technical barrier the centres face.

The fourth question is “What are the inner interoperability problems?” (Keys rendered by one certification centre cannot be checked by the means of digital signatures designed by another certification centre). The first interviewed Certification centre

admitted having interoperability problems with the Accredited centre of Key Certificates of National Bank of Ukraine and of the Privat Bank (compatibility is not reached). The second interviewed centre did not face any inner operability problems. The third one also confirmed that keys provided by one certification centre cannot be verified by the means of a digital signature developed by another certificate authority. It could be also concluded in this regard a common interoperability problem among the Certification centres.

The fifth question is “What are the exterior interoperability problems?” (Acknowledgement of Ukrainian digital electronic signatures abroad and foreign ones in Ukraine). The first two interviewed certification centers responded that they do not have experience in researching this issue. While the third one responded that acknowledgement of Ukrainian digital electronic signatures abroad and foreign ones in Ukraine is an issue.

The sixth question is “What are the legislative problems limiting usage of digital signatures?” The Ministry of Interior’s Certification centre considers that most of Ukrainian laws do not address the possibility of legal relations registration in the areas of both public and private law, exclusively with digital e-signature usage, without duplication in paper form. While “Ukrainian institute of intellectual property” Certification center deems that a restriction lies in an obsolete legislation in the field of digital signature (Law on electronic digital signature by the Ukrainian Parliament of 22.05.2003 № 852-IV). Draft Law of Ukraine on electronic trust services 4685/П of 21.06.2016 which in the opinion of the centre is more modern, did not come into force yet. The last interviewed "National Depository of Ukraine" Certification centre did not provide an answer to this question. Consequently, we can see that answers to this question are unanimous and current legislation is an issue when it comes down to e-signature usage.

As a result, after analysis of interview outcomes it can be concluded that state authorities responsible for e-signature issuance face certain difficulties in their work and have to overcome concrete technical barriers in order to provide services successfully. First it is people’s low level of awareness about possibility of getting a digital e-signature from certification centers and their unfamiliarity with appropriate legislation in this regard. Second is the technical barrier with Ukrainian cryptology standard which does not correspond to international standard and technical bias towards some certain Certification centers. While access to software should be available to all acting certification centers who are in the list of the Ministry of Justice registry irrespective of key certificates format they use. Another obstacle is inner interoperability issues, namely public key certificates issued by different Certification centers are not compatible with each other. Exterior

interoperability problem clearly indicates that Ukrainian digital electronic signatures are not acknowledged abroad and foreign signatures in Ukraine. Lastly there are some problems in legislative field that don't favor digital signature usage in particular, hence service provision on the whole. The legislative base should be actual to the tendency of e-signature provisions, correspond to the needs of public authorities implementing e-governance and above all acknowledge digital e-signature as legally bound and equal to physical one. All the interview questions and responses are available in Ukrainian language in Appendix 2.

## 4.4 Technical Part: As-is and To-be models

This sub chapter is about modeling a concrete public e-service of foreign passport acquisition by Ukrainian citizen. This public service is extremely in demand nowadays especially in the context of upcoming visa free regime between Ukraine and Schengen Area countries. But the possibility of travelling without a visa is possible only after obtaining a biometrical passport. As a consequence, the amount of people requesting the foreign passport has risen immensely and currently there are no time slots in e-queue to get the service. Obtaining a foreign passport in Ukraine on the whole is a bureaucratic long time and resource consuming procedure moreover it is performed on spot. Ukrainian public e-services to which is attached foreign passport acquisition service are not grouped together in one single state portal as well as there is no way to use an ID card connected to the portal obtain an e-service in such a way. This makes the procedure even more complicated. Basically online a citizen can only upload necessary bank detail payment sheet and register in an e-queue. There is still a lot of manual work done by public authority employees in the State's migration service of Ukraine department for foreign passport acquisition. Therefore, there is a strong need to optimize the process of rendering the service by automating the processes with new technologies like system added value feature of application administrator who will be dealing with fulfilling tasks online instead of the employees which will also economize resources and reduce staff's workload. But when suggesting to use a new feature with maximum efficiency there should be created a new business process model a "to-be model" which will facilitate usage of an optimized solution. The subchapter is aimed to conclude that a provided to-be model is more efficient in comparison to as-is model, yet there are some certain barriers for this model to be implemented and analyse the obtained results. The automation process in To-be model is vital as government will spend less resources e.g. staff, paper and time. There will be

suggested an instant online interface for obtaining the service. Also this model should be useful for citizens in terms of time consuming and to those who live in remote places because of immense Ukrainian territory. It will also improve the system to function more accurately on documentation and information provision as the process will be automated.

State Migration Service of Ukraine (SMS) is the main stakeholder in the BP. It is a central executive body, whose activities are managed and coordinated by the Cabinet of Ministers of Ukraine through the Ministry of Interior and implements the state policy on migration (immigration and emigration), including combating illegal migration, citizenship, registration of natural persons, refugees and other categories specified by the legislation of migrants. *(SMS webpage, 2016)*

### 4.4.1 BP for Foreign Passport Acquisition Process As-is model

In As-is model, it is shown the whole process of obtaining foreign passport like it is now. Unfortunately, people cannot obtain it online properly but have to use an e-queue or register online, go on spot, waste their time and go through bureaucracy. BP starts from the moment that citizen registers in an e-queue (no earlier than in two weeks in reality), uploads the necessary bank detail sheet in order to make the payment for the service, goes to the bank (modelled as a sub-process), pays for the service, goes to the State Migration Service shelter 1, asks what documentation is needed to obtain foreign passport, the employee consumes time by searching for the necessary documentation list. gives it to the citizen, the citizen fills in the documents, hands it to the employee, goes back to the shelter, the operator makes copy of the national passport of Ukraine and the ID code. Than the citizen waits in another e-queue, goes to shelter 2, there he takes a photograph, gives biometrical data (finger prints), signs the needed documents. Finally, the citizen asks the employees when is the date to retrieve the passport, the employee replies that no earlier than in 30 days (not 10 as mentioned on the website) and leaves the authority. Citizen returns again after 30 days to the authority, waits in the queue, goes to shelter 3, presents National Ukrainian passport, an employee finds the foreign passport, checks if finger prints coincide, the citizen eventually obtains the foreign passport and the event ends (see Appendix 3).

### 4.4.2 BP for Foreign Passport Acquisition Process To-be Model

Below it is suggested to create a more technologically advanced yet simplified for users way of obtaining e-service how it should be in a developed country with high level of e-participation between its nationals and state authorities due to developed e-governance system. But in the whole the following To-be process is idealistic as it will be difficult to establish such process of obtaining an e-service in Ukraine in a short period of time. Relevant changes in legislative field should first take place, the level of e-governance implementation and public awareness should be risen as well as technological maturity of the country itself. Another challenge in Ukraine for to-be model is an absence of e-identification via ID card and a card reader (as there are centrally accepted ID cards with chips but they are rather dysfunctional as they aren't connected to unified state portal for public e-service like in Estonia e.g. eesti.ee), so in this regard usage of ID cards could be temporarily substituted by identification via bank. Also the second lane is substituted by the application administrator instead of public authority employees working on spot. Such system's added value feature will facilitate smooth, prompt and timeliness fulfilling tasks online instead of the employees who will also economize resources and reduce staff's workload. Starting event is when the citizen logs in via bank identification system, chooses the desired service, digitally signs all needed documents, takes finger prints by using separate device (as existing card reader, which will be like a memory stick), gets the confirmation from the application's administrator, attaches all needed e-documents digitally signed, photographs, makes on-line payment for the service, gets a confirmation that payment is processed and all documentations are submitted successfully, estimation of approximate waiting time till the passport acquisition (no set time as ideally it should be much less than 30 days depending on workload), eventually the citizen gets a confirmation that the passport is issued and can be collected either on spot or by post service and the event ends. Another condition is if the citizen retrieves the passport and it doesn't match he will notify the administrator who will register the case and pass it to the respective authority to be solved, end event (see Appendix 3).

### 4.4.3 Outcomes

As of 11.10.2016 foreign passport was issued to 2 million citizens. *(SMS webpage, 2016).* Therefore, due to To-be model which facilitates the process of acquisition in a smooth and eased way it is expected to achieve an augmented result of citizens using the updated e-service which will significantly facilitate procedure of traveling abroad. Such approach of receiving e-service, described in To-be model economizes citizen's and authority's time, gives quick and prompt results, keeps data in a more secured way and will be highly efficient and technologically advanced for Ukraine. Compared to As-is model, To-be enables timeline service provision, security checks, resources and money economization by staff reduction and introduces paperless format of work process. But of course there are some weaknesses in suggested model too. First it is the 'idealistic' To-be process, as there are no detected by author cases in international experience where a citizen would not need to attend the authority and give fingerprints on spot, as fingerprint devices are used in public authorities only. There would also arise a financial issue as extra expenses on fingerprints collection device in a form of a memory stick would be needed. As well as there will arise an issue of backing the idea of using the fingerprints collection device by the user himself in legislative filed. As Ukrainian legislation is outdated in terms of ICT and has a gap with other western countries, most probably such possible laws might come into force after solid period of time. Yet, probably in future with development of e-governance mechanisms and bridging the gaps in ICT development indexes, Ukraine would apply such initiative.

# 5 Recommendation and Discussion

In this chapter are discussed and integrated main outcomes based on conducted survey, interview and business process. As well as it is outlined some advices from author's perspective how to make Ukrainian public e-services operate on a satisfactory level. The recommendation should result in future creation of single state public e-services portal, where all range of public e-services would be integrated and accessible for citizens. To achieve this, multifunctional ID cards with digital e-signatures connected to the portal are needed as well as events on raising public awareness and popularization of e-governance principles among citizens.

In conformity with survey outcomes in subchapter 4.3.1, people's overall awareness on e-governance is quite high, their eagerness to use public e-services is significant, notwithstanding Ukrainian public e-services are rendered in a chaotic way, not all digitalised and structured in one single state portal and lag a lot with other countries in this regard. Therefore, this drives the author to the conclusion that having no experience about how e-services are provided in developed countries in terms of e- governance like Estonia, respondents believe that public e-service provision in Ukraine without possibility to use properly ID cards connected to the service portal is already satisfactory in comparison to what is provided on spot.

Pursuant to the interviews outcomes in subchapter 4.3.2, Certification centres' common problem is inner interoperability, namely public key certificates rendered by one certification centre cannot be checked by the means of digital e-signatures of other certification centres. This creates a concrete mass in their performance as well as it is unacceptable for citizens who e.g. obtain a digital e-signature in one certification center and try to use services of an authority who has its own Accredited certification center, consequently the user's e-signature cannot be verified. Referring to subchapter 4.2, in author's subjective point of view, the only solution in this regard would be establishment of Single Certification Center in Ukraine for issuance of public key certificates and subsequent encryption of both private and public key certificates on national ID cards chips. Implementation of EIDAS principles in Ukraine should also solve this problem, as it creates single standard for digital e-signatures. Yet, Ukrainian ID cards remain not

functional in terms of giving e-signatures and there are currently no card reading devices in large scale availability for citizens.

Proceeding from the outcomes of suggested As-is and To-be models in subchapter 4.4.3 in author's opinion it is rational to transfer public services to online format and integrate them into 'one stop shop'.

On the basis of conducted overall research, following recommendation steps are shaped:

- creation of central single state portal of public e-services;
- development of updated multifunctional ID cards containing digital e-signatures with encrypted both private and public key certificates;
- augmentation of public awareness.

The Single state portal of public online services should be developed by the government with the synergy of all public authorities and other stakeholders (volunteers, investors, international organizations and foreign states). Ministries and local governments should contribute by providing their public services which would be subsequently integrated in the portal. All the other portals should be eliminated in order to avoid ambiguity and citizens mislead. The portal should be connected to multifunctional ID cards with operable digital e-signatures. The possibility of easily obtaining card reading devices should be offered on spot by responsible public authorities when issuing the ID card and by Ukrainian banks.

There are certain enablers of e-services delivery, which should be seamless and sustainably developed such as: uninterrupted internet coverage all around Ukraine, secured Wi-Fi networks, trustworthy governmental portals, sufficient level of computer literacy among citizens, unified and common international cryptology standards, unique identifiers, single certification center, promoting innovative eID means e.g. MobileID among the users. Having such enablers in Ukraine will boost public e-services development and consumption.

Precondition to public e-services consumption is eID means. Popularization of ID cards being the fundamental eID instrument, results in primarily security preservation, data consistency, state expenditure reduction, simplification for conducting business - thus state economics enhancement, convenience for people. ID cards ensure usage of digital e-signature and paperless management of documentation between the

governmental structures as well as between the government and citizens. This facilitates prompt feedback, efficiency and security enhancement. ID cards usage conduces to expanding its functions e.g. be a valid transport ticket, contain diverse discounts for shops, pharmacies, possibility to vote online in the future or even serve as a driving license.

As it was already mentioned by the author in subchapter 4.2 public awareness is a significant impediment of successful e-governance implementation. That is the reason why question "How to raise public awareness in order to implement e-service provision more efficiently?" was chosen to be RQ 1. There is a direct link between theoretical framework and given recommendation. In conformity with subchapter 2.2, GG encourages the public trust and participation that enables services to improve *(The Independent Commission on good governance in public services, 2004)*. Consequently, if the public awareness is high, the government is customer oriented and is ready to meet the citizen's needs, the whole process of service consumption becomes more transparent and user oriented. This involves NPM's approach three strategic orientations: market-orientation, stakeholder-orientation, and customer-orientation *(Diefenbach, T., 2009)*.

In this regard, author deems that launching official campaigns on sharing knowledge about e-governance principles and e-services benefits among the citizens, on a regular base should augment public awareness and engagement. Campaign's primary target should be bringing to the audience attention why specifically public online services and not regular public services could simplify people's everyday life. Clear benefits would be: time and money economization, avoiding excessive bureaucratic procedures by contacting public authorities. It is extra actual given Ukraine's big territory and poor road connections, as well as lack of Centres for rendering administrative services in all cities. Ideally such campaigns should involve foreign experts on e-governance e.g. Estonian eGA who would firstly share their positive experience on e-governance development and implemetation in their own countries and secondly suggest concrete ways of augmenting e-governance penetration level in the society. Of course such campaigns are cost consuming, but with the support of some EU countries and international organizations it is doable. This would significantly impact the dissemination of positive e-governance image among the citizens. Such campaigns should also involve explanation of e-services usage benefits by taking one specific public e-service (e.g. foreign passport acquisition, which nowadays is the most desired one and not rendered in a satisfactory way) outline its current state with all disadvantages like queues, bureaucracy and suggest an online way to obtain this service. The similar way as it is

discussed by the author in subchapter 4.4. when As-is and To-be models of the above mentioned e-service are suggested. Free workshops on raising citizen's computer literacy and practical lessons on how exactly to use public e-services with the mean of ID card, BankID or other eID methods should also take place. Last but not the least should be provided training programs for public servants on all state authorities levels in order to increase the level of their competence and awareness. After campaigns have been carried out it is worth again to apply GG principle on receiving feedback from people and estimate the efficiency of conducting events targeted on raising people's awareness. The above mentioned recommendation steps are called to push public e-service provision and make a significant contribution in e-governance development on the whole. Benefits from using public e-services for the people result in economization of time and resources, raising their computer literacy level, acquiring prompt and accurate feedback from the government. According to NPM approach, government should be the active cooperation mediator between the other stakeholders and should not to impose its decisions and lobby its interest like it is often done in Ukraine. As a consequence, naturally the best practice would be unified joint efforts on development successful public e-services provision by government, innovative private sector and civil society organizations.

# 6 Summary

This chapter aims to indicate evident synergy between topic actuality, the research set purpose, relevant employed methodology and conducted research in order to find answers to the research questions.

The topic of successful public e-services provision and consumption in Ukraine is extremely actual nowadays as along with other e-governance instruments it is called to solve main problems for citizens and entrepreneurs: decrease corruption level, bureaucracy procedures, augment government's transparency and accountability to the citizens, raise people's computer literacy and e-participation in decision making mechanisms, ease everyday life activities by time and resource economization.

The research overall purpose was finding out "How to make currently public e-services work in Ukraine?" In order to answer this meta question then necessary components and enablers of e-services provision were analyzed, in addition main obstacles which hinder successful public e-service delivery and consumption were discussed. Possible ways of improvement were suggested as recommendation steps in Chapter 5.

Chosen research methodology successfully fitted the conducted research outcomes. Particularly, qualitative analysis was beneficial to conducting survey for the citizens and interview with public authorities. In addition to main research methods comparative analysis was employed of making overview of existing body of knowledge and theoretical framework to make linkage with practical part of the thesis. Discussion of Estonian and Austrian experiences on successful public e-services implementation was intended as an orientation for Ukraine in the future. BPM was effectively exercised when modeling As-is and To-be processes of the most popular Ukrainian public service of foreign passport acquisition.

Conducted survey and interview provided a real picture of what is going on with public awareness on e-governance instruments and public e-services as well as what interferes with functionality of public authorities responsible for e-service provision.

All the above mentioned constituents of the overall research resulted in finding answers to research questions.

## 6.1 Answers to Research Questions

The main research question set in this paper was “How to make currently public e-services work in Ukraine?” Pursuant to Chapter 5 recommendation steps, in author’s opinion it is needed to: create central single state portal of public e-services, develop updated multifunctional ID cards containing digital e-signatures with encrypted both private and public key certificates; augment public awareness.

According to the conducted survey citizens are not fully familiar with all eID means existing in Ukraine, 26,8% of the respondents named pin calculator as an eID method, which is a correct answer for Estonia, but in Ukraine pin calculators are not introduced. People have mistakenly taken it for e-tokens. 52,9% of respondents mentioned that ID cards could be used both as an authentication method and to get an e-service, which is theoretically correct, but not in Ukraine where ID cards are not still fully equipped with digital e-signatures. Although the results showed that public awareness on e-governance mechanisms and public e-services consumption is high, their responses didn’t mirror the actual knowledge of Ukrainians towards technological solutions. People can be familiar with terms but they are not aware of how it actually is used in practice. Additionally, having no comparison with other countries successful experience in public e-services delivery, the respondents are very eager to use at least the existing services. The maturity aspect of Ukrainian e-services also indicates that mostly they are revealed on the first emerging and second enhanced stages.

First research sub question was “How to raise public awareness in order to implement e-service provision more efficiently?”. In conformity with subchapter 4.2 and chapter 5 it is necessary to hold regular training campaigns for public servants in order to increase the level of their proficiency and knowledgeability of the matter. As well as conduct regular official campaigns for dissemination of e-governance principles among citizens and o teach them how to use ID cards and public e-services.

Second research sub question was “How e-identity facilitates public e-services provision?”. Answer to this question lies in eIDAS provision as well as justifies that eID is a precondition to service provision. As discussed in subchapter 4.2 and chapter 5, public e-service consumption is not possible without one of eID methods, such as ID cards, MobileID or BankID. In Ukraine currently BankID is the only possible eID mean which however does not enable digitally signing important documentation. So full public e-service consumption is not possible without operable ID cards in this regard.

## 6.2 Implications for Future Research

The purpose of this thesis was to investigate public e-services provision and consumption on a central governmental level in Ukraine. However, existing local public e-services were not envisaged in the given paper. Thus, this work provides a beneficial ground for further research of Ukrainian public local e-services and creation of their synergy with the central ones. Simultaneously, maturity aspect of public e-services was not a subject of given thesis investigation. It was only discussed theoretical stage models of e-services maturity and the maturity level of Ukrainian public e-services. In future research evaluation of Ukrainian public e-services maturity level could be additionally examined and finding ways of its augmentation.

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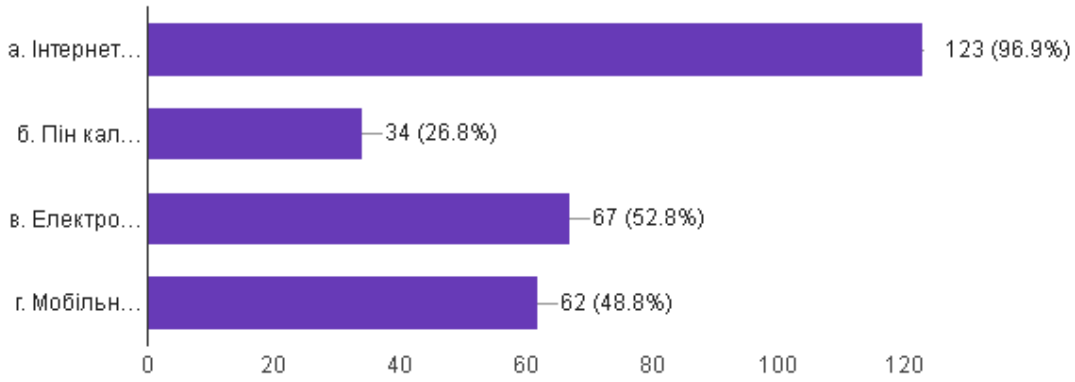
**Appendix 1 – Survey for citizens in Ukrainian language.**

# Дослідження для громадян України

129 responses

## 1) З якими методами е-ідентифікації ви знайомі?

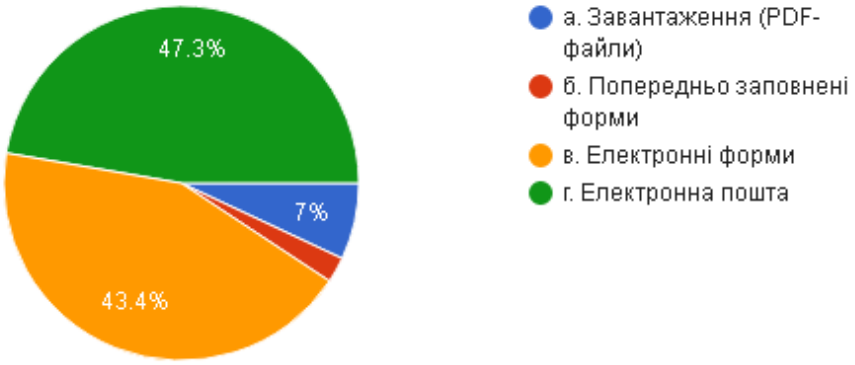
(127 responses)



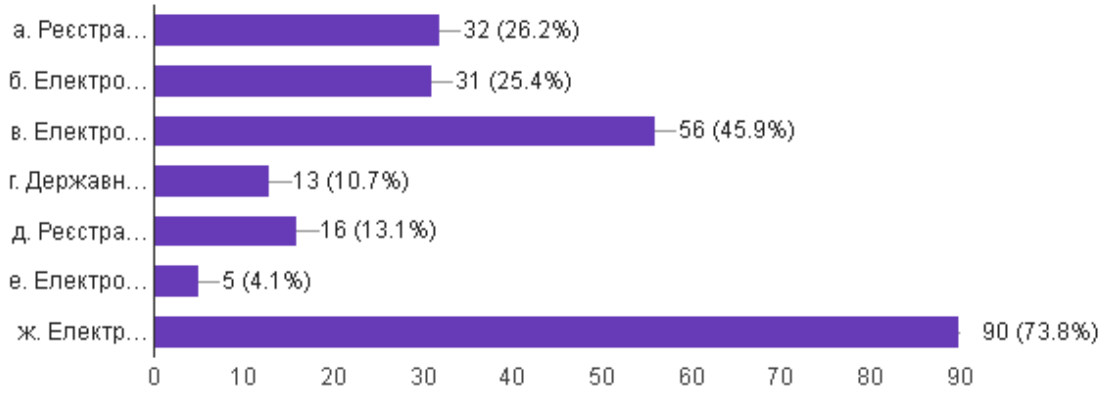
## 2) Що таке цифровий електронний підпис? (129 responses)


## 3) Які найбільш часто використовуються канали електронних послуг?

(129 responses)

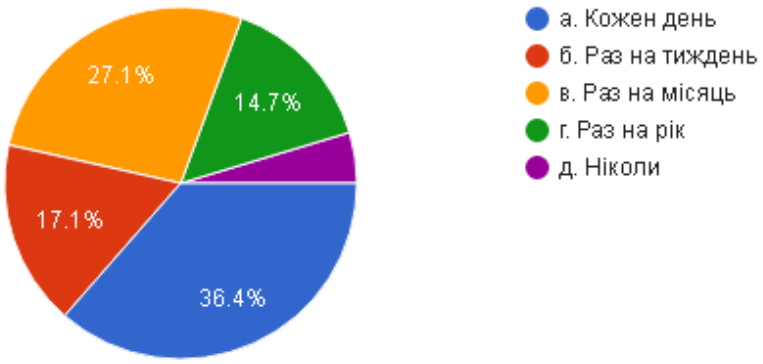


## 4) Які найбільш популярні електронні послуги? (122 responses)

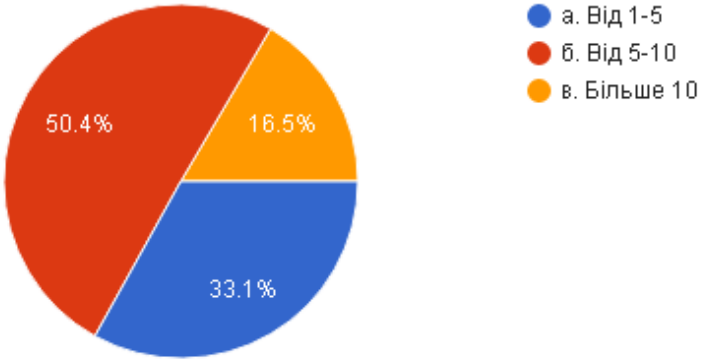



## 5) Як часто Ви користуєтеся електронними послугами? (Частота використання)

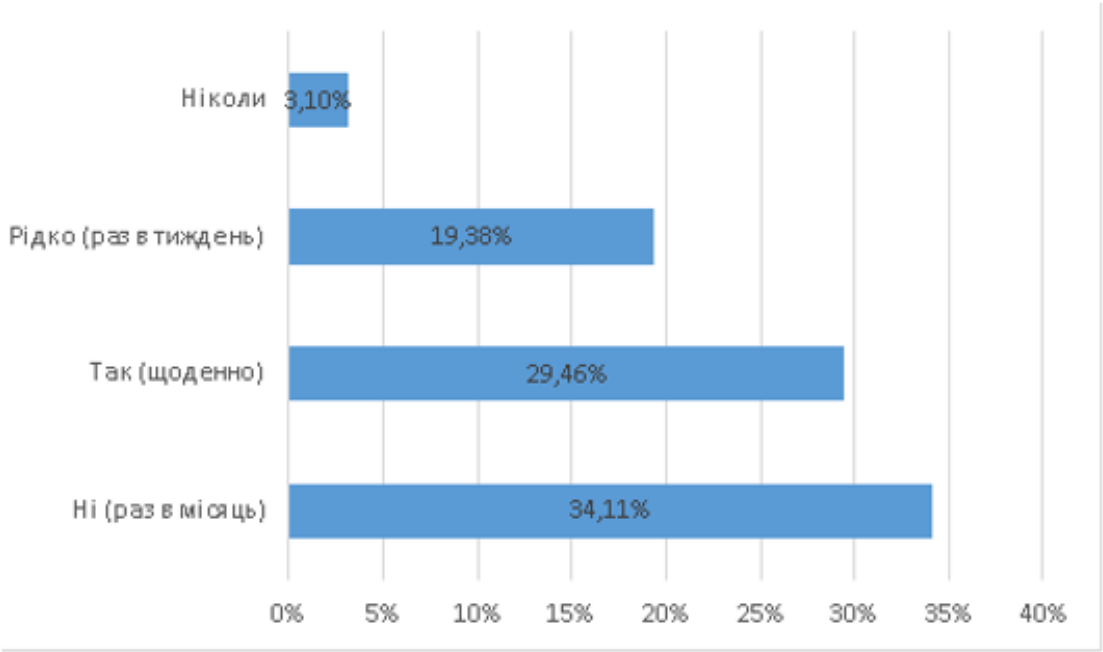
(129 responses)



6) Скільки кліків Ви робите, щоб отримати електронну послугу? (Зручність і досвід користування)
(127 responses)

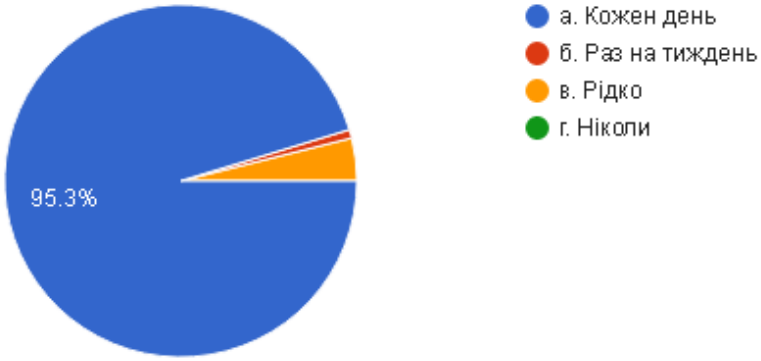



7) Ви часто відвідуєте урядові портали? (111 responses)



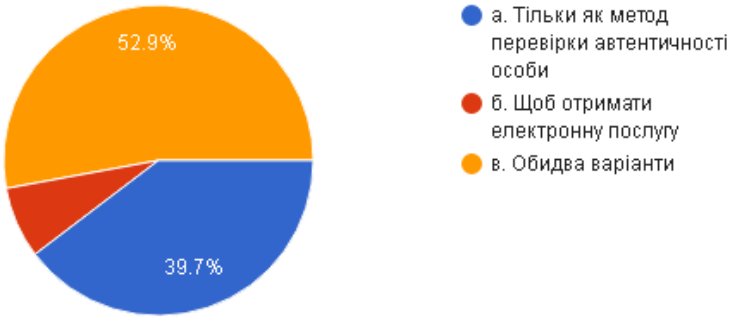
8) Як часто Ви користуєтесь комп'ютером? (Комп'ютерна грамотність)

(128 responses)



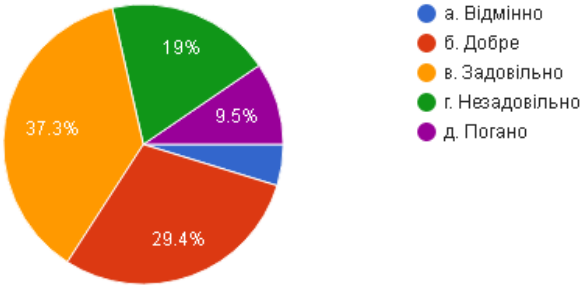

9) Як Ви можете користуватися ідентифікаційною карткою посвідчення особи?

(121 responses)

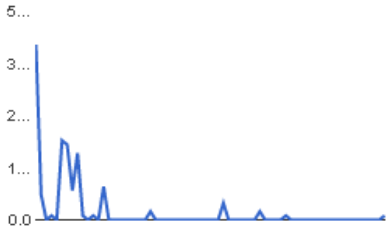


10) Як ви оцінюєте якість надання електронних послуг?

(126 responses)




Number of daily responses



## Appendix 2 – Interview with Key Certification Centres in Ukrainian language.

# Питання до центрів сертифікації ключів в Україні

### Назва центру сертифікації

3 responses

- Акредитований центр сертифікації ключів Міністерства внутрішніх справ України
- Центр сертифікації ключів державного підприємства " Український інститут інтелектуальної власності "
- АЦСК ПАТ "НДУ"

### 1. Які труднощі виникають із наданням цифрового підпису?

3 responses

- Слабка обізнаність користувачів щодо вимог до використання ЕЦП, небажання знайомитися із законодавством і вимогами в цій сфері.
- Не виникають
- Кількість персоналу

### 2. Яка кількість користувачів?

2 responses

- Наш центр сертифікації має ще не дуже великий опит роботи-3 роки. Кількість підписувачів приблизно 500 осіб (фізичні особи, юридичні та підприємці).
- Конфіденційна інформація

## 3. Які бувають технічні проблеми/ бар'єри? (Проблеми криптології - українські розробники програмного забезпечення не можуть використовувати універсальні стандарти криптологічних алгоритмів і форматів підпису для українських користувачів)

3 responses

Немає

На мій погляд на сьогодні проблема є в використанні розробниками програмного забезпечення форматів ключів тільки 'певних' центрів сертифікації. Потрібно надавати доступ до програмного забезпечення всім акредитованим центрам сертифікації, що на даний момент є в довірчому списку (реєстрі) Центрального засвідчувального органу Міністерства юстиції України (див. http://czo.gov.ua/ca-registry), дія яких не припинена та незалежно від того на яких форматах ключів вони працюють.

Українські розробники програмного забезпечення не можуть використовувати міжнародні стандарти для українських користувачів.

## 4. Які виникають внутрішні проблеми інтероперабельності? (Ключі, що надаються одним центром сертифікації, не можуть бути перевірені за допомогою засобів цифрового підпису, розроблених іншим центром сертифікації)

3 responses

Виникають складнощі перевірки сумісності (сумісність не досягається) з АЦСК НБУ та АЦСК ПриватБанку

не має

Ключі, що надаються одним центром сертифікації, не можуть бути перевірені за допомогою засобів цифрового підпису, розроблених іншим центром сертифікації

## 5. Які зовнішні проблеми інтероперабельності? (Визнання українських цифрових електронних підписів за кордоном та іноземних в Україні)

3 responses

Досвід відсутній

Ще не досліджували .

(Визнання українських цифрових електронних підписів за кордоном та іноземних в Україні

## 6. Які існують законодавчі проблеми, що обмежують використання цифрових підписів?

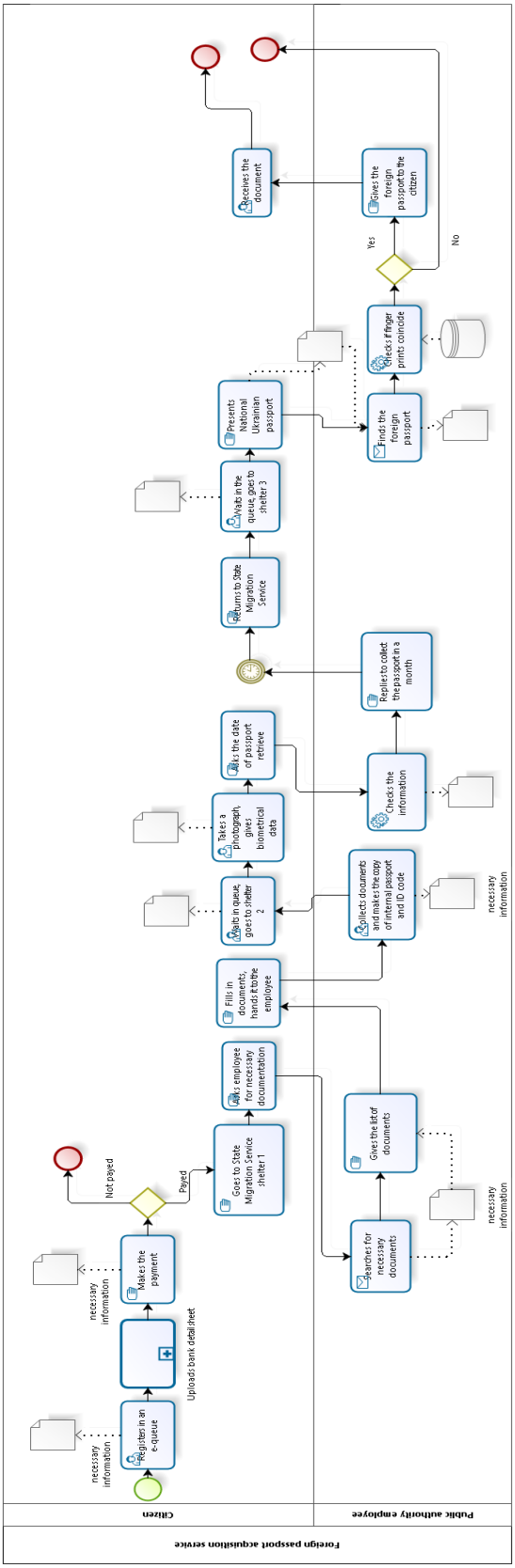
3 responses

Більшість законодавчих актів не враховують можливість оформлення правових відносин, як в сфері публічного, так і приватного права, виключно з використанням ЕЦП, без дублювання у паперовій формі

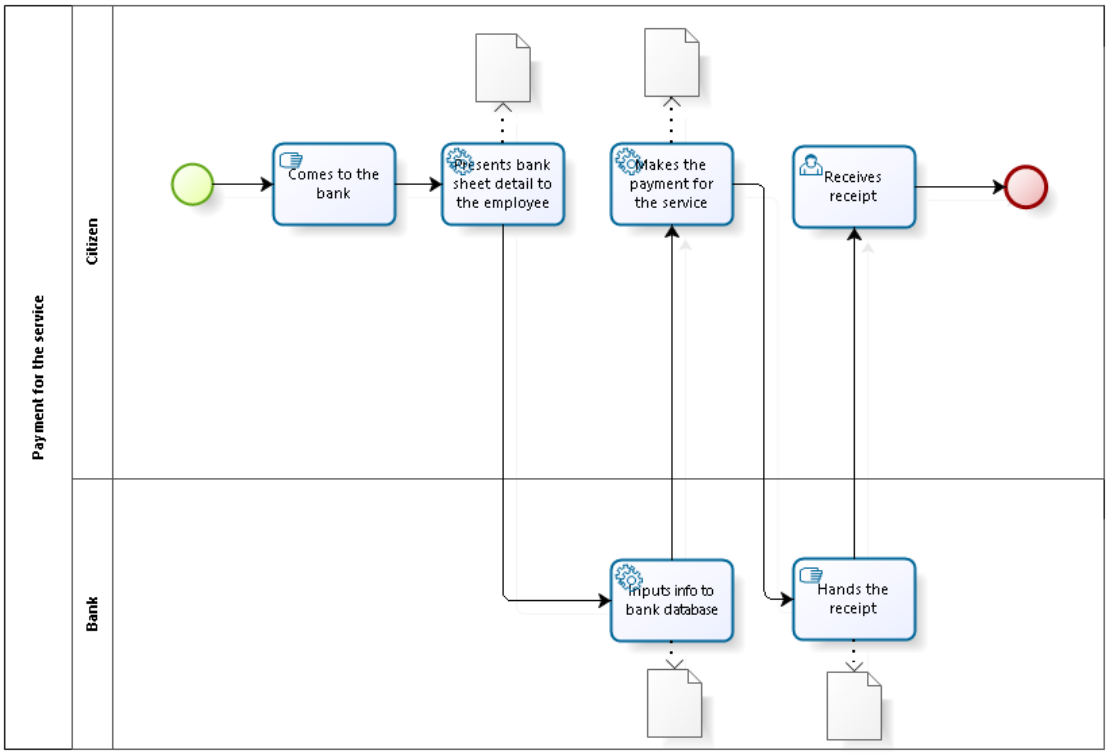
Обмеження - застаріле законодавство у сфері електронного цифрового підпису ( Закон від 22.05.2003 № 852-IV Про електронний цифровий підпис Верховна Рада України ). Проект Закону України про електронні довірчі послуги 4685/П від 21.06.2016 що на мій погляд є більш сучасним, ще не введено в дію.

-

# Appendix 3 - As-is model for foreign passport acquisition BP



# Sub-task for As-is model



# To-be model for foreign passport acquisition BP