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DIPLOMA THESIS

**Analysis and design of online public service in Addis Ababa,
Ethiopia**

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DIPLOMA THESIS ASSIGNMENT

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Informatics

Thesis title

Analysis and design of online public service in Addis Ababa, Ethiopia

Objectives of thesis

The main goal is to analyze and design a new online public service for Addis Ababa.

Partial goals are:

- To characterize the current state of online public services and e-government readiness in Addis Ababa, Ethiopia and main urban areas,
- To analyze to analyze the weaknesses of the current immigration system in Ethiopian Ministry of Foreign Affairs (Ethiopian Immigration Authority) Addis Ababa and;
- To analyze and design a new online public service.

Methodology

The methodology is based on the analysis of the literature survey and own experience. The practical part will be designing e-service for Ethiopian Ministry of Foreign Affairs (Ethiopian Immigration Authority) which will include services like the appointment for passport application, renewal, and collection. The e-service will be designed using software engineering tools such as UML and web design software like HTML, CSS, PHP, and MySQL. Based on the literature review, analysis of opportunities and barriers for new online public services and analysis results collected through the survey, recommendations and conclusions will be formulated.

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Declaration

I declare that I have worked on my diploma thesis titled "Analysis and design of online services" by myself and I have used only the sources mentioned at the end of the thesis. As the author of the diploma thesis, I declare that the thesis does not break copyrights of any their person.

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Abate Yinagn Iwnetu

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**Analysis and design of online public service
in Addis Ababa, Ethiopia**

**Analýza a návrh on-line veřejné služby v etiopské
Addis Abebě**

Souhrn

Tato práce se zabývá bariérami e-governmentu v Etiopii. Hlavním cílem této práce je identifikovat problémy spojené s zadostim pasu / zápisu a pokusí se zajistit odpovídající řešení. Tato práce se zabývá současný stav e-governmentu v Etiopii a analyzuje rozsah pokrytí těchto služeb v zemi. Jakmile jsou nedostatky zjistieno, autor navrhuje služby online portál. Tento portál bude vycházet z literatury, osobních zkušeností a výběrových šetření probíhá.

V praktické části, webová aplikace byla vytvořena pomocí HTML5, CSS3 a PHP. Žádost obsahuje údaje informace o uživatelských (žadatele pas) k, jako je celé jméno, datum narození, adresa a další atributy. Tato data se vloží do databáze SQL, která budou data do webové aplikace.

Klíčová slova: Analýza, e-government v etiopské Addis Abebě, on-line služby, webové aplikace, elektronické služby

Summary

This thesis deals with the barriers of e-government in Ethiopia. The main goal of this thesis is to identify the problems associated with Passport application/registration and tries to provide an appropriate solution. The thesis discusses the current situation of e-government in Ethiopia and analyzes the extent of coverage of such services in the country. Once the drawbacks are found out, the author proposes an online service portal. This portal will be based on the literature, personal experience and sample surveys conducted.

In the practical part, a web application was created using HTML5, CSS3 and PHP. The application includes details information about the user (passport applicant), such as full name, date of birth, address and other attributes. This data is inserted into a SQL database, which will feed the data to the web application.

Keywords: Analysis, e-government in Addis Ababa, Ethiopia, online services, web application, e-services

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1. Introduction

1.1. E-government

Before discussing about e-government, it is important to know what government is and what its responsibilities towards its people are. A government can be defined as a group of people with the authority to govern a country or state.

E-government, short for electronic government system, is a broad concept/term for web-based services related to agencies of state and federal governments. E-government involves the use of information technology and the Internet to support government operations and service. The interaction may be in the form of obtaining information, filings, or making payments and a host of other activities via the World Wide Web (Sharma & Gupta, 2003, Sharma, 2004, Sharma 2006)

E-Government is one of the most important instruments for modernization and reform as governments deal with the continuing pressure of increasing their performance and adapting to the pressure of the new information society. (Morven McLean, 2004)

E-governance is using information and communication technologies at various levels of the government and the public sector for enhancing governance (Bedi, Singh and Srivastava, 2001; Holmes, 2001; Okot-Uma, 2000). According to Keohane and Nye (2000), "Governance implies the processes and institutions, both formal and informal, that guide and confine the collective activities of a group. Government is an entity that acts with authority and creates formal obligations. Governance need not necessarily be conducted exclusively by governments. Private firms, associations of firms, nongovernmental organizations (NGOs), and associations of NGOs all engage in it, often in association with governmental bodies, to create governance; sometimes without governmental authority." Thus, it is understandable that e-governance need not be limited to the public sector and can be applied in the private sector as well.

The UNESCO definition (www.unesco.org) is: “E-governance is the public sector’s use of information and communication technologies with the aim of improving information and service delivery, encouraging citizen participation in the decision-making process and making government more accountable, transparent and effective. E-governance involves new styles of leadership, new ways of debating and deciding policy and investment, new ways of accessing education, new ways of listening to citizens and new ways of organizing and delivering information and services. E-governance is generally considered as a wider concept than e-government, since it can bring about a change in the way citizens relate to governments and to each other. E-governance can bring forth new concepts of citizenship, both in terms of citizen needs and responsibilities. Its objective is to engage, enable and empower the citizen.”

E-Government has been employed by developing countries to be an empowering agent toward quickening methods, conveying a large amount of services to public and organizations, expanding transparency and responsibility while decreasing the costs. Ethiopia being among the world’s developing nations, its government has built E-Government Directorate under the Ministry of IT. (Technology, 2005). Ethiopia, based on the 2008 UN E-Readiness index report, is ranking 172 from 192 countries scoring a total 0.1857 and distributed to 0.1739 in web measure index. Although, the status is far below the world average, the trends in striding towards these averages are encouraging.

2. Objectives and Methodology

2.1. Objectives

The main goal is to analyze the weaknesses of the current immigration system in Ethiopian Ministry of Foreign Affairs (Ethiopian Immigration Authority) Addis Ababa. In addition, a design of a new online public service will be presented which would provide the user with the good interface to utilize e-immigration services on the same portal. Partial goals of this thesis are to characterize the current state of online public services and e-government readiness in Addis Ababa. This would be done through survey and based on the own experiences of the author.

Further the thesis will try to analyze opportunities and barriers for online public services in Addis Ababa, Ethiopia based on that a new online public service will be designed to make an overall evaluation. This design will not be considering all the services but it will be a design and the thesis will further discuss how that design can be improved and take maximum benefits.

2.2. Methodology

The methodology is based on the analysis of the literature survey and own experience. The practical part will be designing e-service for Ethiopian Ministry of Foreign Affairs (Ethiopian Immigration Authority) which will include services like the appointment for passport application, renewal, and collection. The e-service will be designed using software engineering tools such as UML and web design software like HTML, CSS, PHP, and MySQL. Based on the literature review, analysis of opportunities and barriers for new online public services and analysis results collected through the survey, recommendations and conclusions will be formulated.

3. Literature Review

This section covers a review of related research works done in the area related to the concept of e-government. Further, the principles and management of e-government will be discussed and applications of e-government in developing countries specifically in Ethiopia will be described. Finally, opportunities and challenges of e-government in Ethiopia will be stated.

E-Government is given different definition by different authors. Horan, (2005) defined E-Government as deliverance of services by Government to benefit citizens, businesses and government employees through use of ICT. It can be also defined the as use of information and communication technologies to promote more efficient and effective government, making it accessible and accountable to citizens UNESCO (2005:5-6).

Implementation of E-Government provides significant benefits, including: Improved efficiency, bigger access to services, greater accountability, transparency and citizen empowerment (L.L. Tung, 2005), lowered costs and time for services (D. Gilbert, 2004). It has also strategic advantages like improved decision-making through streamlining of information, enhanced knowledge sharing and organizational learning (J. Zhang, 2005). Since the implementation of government started in the world wide, there is a huge gap among economically developed and developing countries in the rate of growth (Gupta, 2008). E-Government projects absorb an increasing proportion of public sector budget to fulfill promises to provide solutions to many public sectors problems.

While many governments have recognized and taken initiatives to implement e-Government projects and applications in the respective domain, evidence shows that most of these projects fail or can be classified as total failures, in which the system is never implemented or is implemented but is completely abandoned, and partial failure, in which major objectives are not attained (Heeks, 2005). The target group of e-Government services is highly heterogeneous, as it comprises the entire population of a country differing in cultures, languages and skills, political opinions suggest that governments need to develop e-Government capability by maturing through a learning curve that resembles repeated patterns, through integration between local and provincial government departments. A mature e-Government is characterized by high level of capability and performance of multiple dimensions. Capabilities include the ability to share data and

information across different government departments by reducing the process time through re-engineering the system and ability to capture and share the knowledge of government employees at the highest level (Karl W. Sandberg, 2007).

3.1. Management of E-Government

As it is clearly described by Richard Heeks in Management Program of Countries, e-Government can be seen in 3 different approaches.

The first one is: **Central** approaches in which central government make decision about e-Government as well as information systems, policies, communications and frameworks. Benefits of implementing Central approach can be seen from different angles. As E-Government being centralized, it uses standard type of process, equipment and other specifics. Using common purchases of equipment and products ensures a cost saving as bulk purchases prove cheaper. It will also avoid duplication by centralized purchase. Other possible benefit of central approach can be resource sharing using common resources together like storage and primarily information. A good example of Centralized e-Government is the Czech Republic where the Czech Republic's Ministry of interior manages the e-Government program centrally.

The second approach is the **Decentralized** approach of managing the e-Government program. This type of approach induces the departments or users of the systems to make decisions regarding how e-Government operates in their departments. It will also enable end users to decide on the policies and frameworks to be implemented within the department or ministry. This type of approach ensures the identification and fulfillment of user's real needs, which will give satisfaction for the end users and successful operation within that government department.

The third approach is **Hybrid** approach, which is considered as an intermediate of the previous two categories where decisions on e-Government are taken by both the end users and central ones depending on each country/case. In most cases the client server based approach has been used, where the server component is centrally managed while the client is based on the departmental aspects, so repositories are kept under the central government (Heeks, 2005).

3.2. Relationships of E-government

Appearances of e-government can be described as the utilization of Information and Communication Technologies (ICT) to support forms inside the government and for the conveyance of administrations to its customers, including different associations, public and some other business organizations.

Although the scope of E-government involves several initiatives in the process of providing services, there are primarily four types of interaction, which form the foundation of e-government deployment. These are *Government to Government (G2G)*, *Government to Citizen (G2C)*, *Government to Business (G2B)*, and *Government to Employees G2E*.

The G2G interaction primarily involves initiative that intended to the sharing of information among public organizations and various levels Government administration. In the case of G2C initiative, the target of the system would be citizens or customers. Accordingly, the initiative will be aimed to provide information and services to the public. In this regard, services such as certification, licensing, paying taxes/bills are found to be a common practice. Similarly, in G2B initiatives, E-Government service will target businesses. The initiatives can involve activities such as procurement of goods and services by the government from the commercial business entities and sale of government goods to the public. Moreover, this type of interaction involves the transaction and exchange between the government and the businesses regarding licenses and taxation among others. G2E is the last initiative, which is targeted in serving the employees. The scheme could cover activities such as employment opportunities, work guidelines, rules & regulations benefits and pay structures for the government employees, employee welfare, work rules and regulations, government housing among others (UNESCO, 2005).

3.3. Advantages and disadvantages of e-government

Everything has its positives and negatives. On the one hand online services make our life better and bring transparency and flexibility to the services provided by the government and on the other hand, it has some drawbacks. The following table identifies some of the advantages and disadvantages.

Advantages	Disadvantages
It is much cheaper for both government and public	Building and maintaining a new website can require a lot of money. It needs professionals and some technical costs.
It is much quicker than traditional way of services where people must wait a queue and the workers can be either lazy or slow.	Implementing new security ways can cause problems for citizens to provide more information about them.
Websites provide better ways to manage the Information compared to the traditional ways. Hypertexts allow us to provide access to complex sets of information in easier and user-friendly way.	It can cause some security dangers to the government. It can give a chance to hackers to hack the system and that can be tragic for the government and for the citizens who will use these services
It is a new way of governance and it provides a new, additional point of contact. Only 20% of the whole population of the world has access to internet but it is increasing every year especially in developing countries.	One of the biggest drawbacks of these services in developing countries is that they are not under the reach of everyone as it is known that developing countries do not have a wide range of internet access to its citizens.

Table 1. Advantages and disadvantages of e-government

Source: (Danieli, 2008)

3.4. Basic phases of E-Services to citizens

Here are some of the basic phases to public in e-government. These phases are divided in several categories which are following:

- **Informational:** The first phase is informational phase which incorporates the provision of information alone. The quality, ease of use and currency of the content tells the value of this phase. This is the easiest phase of all.
- **Interactive:** This is the second phase of e-services provided in the e-government and its job is to just provide online interaction. For example, people can write complaints or applications for job online but this phase does not provide secure transactions such as financial or some other transactions which need high level authorization.
- **Transactional:** The next phase is called transactional phase and this phase is upgrade version of the previous phase. This phase provides secure transactions with better authorization. In this phase people, can apply for passports, NICs and they can pay online. This phase needs a high-level security and good infrastructure for enabling secure transactions.
- **Collaborative:** The last phase is collaborative, in this phase the public and the business organizations collaborate with the government on different type o processes, projects, etc. This phase is important because businesses work with the government and private NGOs and pubic work with the government. It needs a system which enables to bring all suppliers, consumers and the government on the same place (Technology, 2005)

3.5. E-Government in Developing Countries

It is now broadly acknowledged that ICT offers plenty of chances for economic development and plays a critical role for rapid economic change, productive capacity improvements and international competitiveness enhancement for developing countries. ICTs offer the potential not just to collect, store, process and diffuse enormous quantities of information at minimal cost, but also to network, interact and communicate across the world (Crede and Mansell, 1998).

According to Richard Heeks, most of the time, developing countries are caught in spending resources to push significant changes like e-Government on the premise of models, which may not work in contexts that are significantly different from the advanced ones. (Heeks, 2002). In developing countries, the topic of e-Government is getting popular one and research in this area is focused upon government related problems and usability of e-Government websites however little attention has been given to people's perspective. (Jyoti Choudrie, 2004). E-Services obtainable by government are much more than simple automation and it improve civic involvement in policy making process. However, e-Government is not like e-business, hence government cannot simply transplant private sector ideas into the public sector. Thus, at the same time as the government may trigger development of a new technology, its regulations can end up holding back the natural diffusion of technological innovations. (Gonzalez, 2007). It is, therefore, suggested that the design of emerging e-services should reflect user's needs, as well as laws and regulations set by various governmental bodies. Citizens are normally developed loyalty to those e-Government portals that are citizen-centric and address their needs.

It is not hardly surprising that in some developing countries, national and local languages are not taking in account when implementing e-governance portals, which is immediately apparent only for those of skilled people and well educated. Kertesz (2003) puts forward a possible reason for the limited success of e- Government, arguing that

“E-Government initiatives in developing countries are not always based on economic soundness – instead they are fueled by lobby groups, pride or international pressure”. He further argues that “benefits are overstated, risks and problems are disregarded” and suggests that performing needs assessment of these investments is crucial. Such analysis must be based on local needs, and resources. When discussing vested interests and resistance by government officials, bureaucracy for its control over employees, and making public organizations self-serving instead of serving society. He further argues that ICT can be used to reform bureaucracy, but e-Government failure can be a consequence of bureaucracy. (Kertesz, 2002).

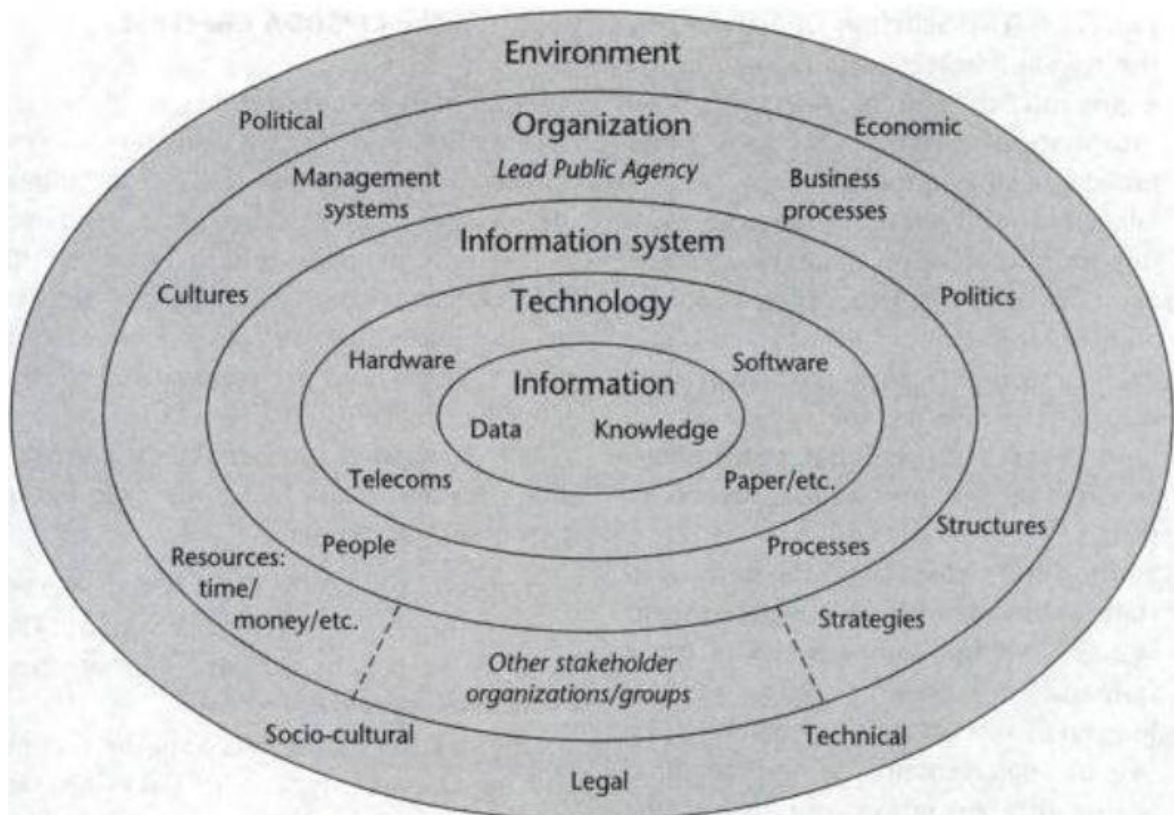


Figure 1: A Full Model of E-Government Systems

Source: Implementing & Managing e-Government (2006)

Another view of e-Government is given based on the processes conducted, where it is mentioned that for every single task, the system needs to capture some information, which would be inputted by an individual, the information system would then process this information which it will eventually store and provide as an output to the whole process.

As seen by the same author Richard Heeks the management of an e-Government strategy could come in 2 forms, one being the technical/scientific mechanism of management where every task is broken to a science and then perfected to provide optimal results and look at aspects in a very qualitative manner. The second being the manner of management, considered to be the Socio-technical manner, where the social needs of the individuals are taken into consideration. The author Richard Heeks quotes March &

Simons text Organizational Theory specifying that the government sector is a highly politicized environment where the use of a technical approach will not work effectively. However, Heeks points out that in some cases the use of the technical approach might function based on the organizational balance (Heeks, 2005).

3.5.1. E-Government Challenges in Developing Countries

Schuppan described that developing countries have been launching e-government ventures with backing from donor associations. Under the name “Information and Communication Technologies for Development” (ICT4D), these associations are highlighting the relevance of ICT in general, and e-government in specifically, as approach to promote development and decrease poverty; desires from these developments are high. One could contend that e-government can, in general, contribute to solving managerial issues, however e-Government and its connected authoritative ideas were produced in industrialized nations; it should not be expected that this idea is consequently proper for developing countries like idea of e-commerce is not necessarily work in e- Government area. In this manner, it is needed to study local culture, association standards and individuals e-Readiness before applying these ideas in developing countries. Access to this technological infrastructure must be considered with supporting framework, for example roads and reliable electricity etc. These among different limitations for example the absence of training and education of both citizens and workers, contribute to the digital separation, which is it-self a major constraint to understanding the objective of e- Government (Reffat, 2006). The digital separation is a barrier to e-Government in that individuals who do not have access to the internet will not be able to take advantages from online services (Schuppan, 2009).

3.5.2. E-Government differences between developed and developing countries

Differences between developed and developing countries E-government strategies had large impact on the way government interacts with their citizens. Developed countries had made a significant advancement in e-government application as compare to developing countries. It is important to know the significant difference between develop and developing countries

	Developed Countries	Developing Countries
History and Culture	Early development in government and economy immediately after independence. Economy growing at a constant rate, productivity increasing, high standard of living.	Government usually not specifically defined; economy not increasing in productivity Economy not growing or increasing productivity; low standard of living
Technical Staff	Has a current technical staff, needs to increase technical abilities and hire younger professionals Current staff would be able to define requirements for development	Does not have a technical staff. Current staff may be unable to define specific requirements.
Infrastructure	Better infrastructure High internet access for employees and citizens	Bad infrastructure Low internet access for employees and citizens.
Citizens	High Internet access and computer literacy; still has digital divide and privacy issues. Relatively more experienced in democratic system and more actively participate in governmental policy-making process	Low Internet access and citizens don't trust online services; few citizens know how to operate computers. Relatively less experienced in democratic system and less active participation in governmental policy-making process
Government Officers	Decent computer literacy and dedication of resources; many do not place e-government at a high priority	Low computer literacy and dedication of resources; many do not place e-government at a high priority due to lack of knowledge on the issue

Table 2: E-government differences between developed and developing countries
Source: E-Government Strategies in Developed and Developing Countries.

Chen. 2006, vol.1.

3.5.3. National income and e-government development

The income level of a country is considered as an indicator of the economic performance, and thus has a strong influence on any development related to e-government. ICT infrastructure and the provision of education are connected and related to the income level of a nation. The lack of these enabling factors places strong constraints on implementing e-government initiatives, even if sound policies and national strategies are in place. As a result, and even with efforts in some countries to offer online infrastructure and services, the full vision of e-government is far from being fully realized, especially if we took closer look to the lower-middle income and low income countries, as evidenced by their poor EGDI performance. However, that national income usually does not, by itself, guarantee enhanced e-government development, as evidenced highlighted in Figure 1.5 and Figure 1.6. Some countries have significantly enhanced their e-government development ranking even if their relatively low national income, as many other countries despite their relatively high income and thereby have good opportunities for future improvement. The main point of better e-government progress is often putting in place an effective governance framework to support and manage a citizen-centric service delivery model, including an ICT laws, policies and e-government strategy, as well as enhancing institutions and building the abilities of public servants. (NATIONS, 2014)

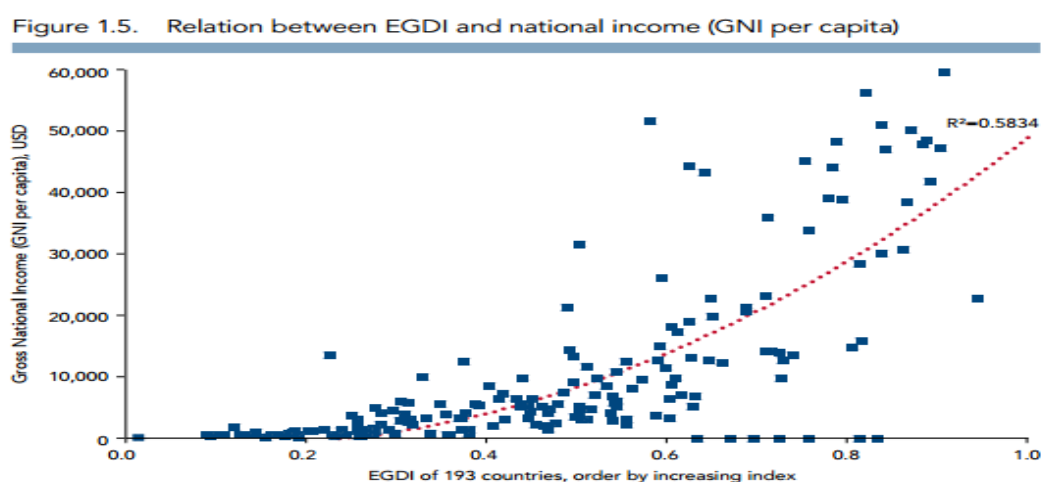


Figure 2 Relation between EGDI and national income (GNI per capita)

Source: United Nation's E-Government survey 2014

E-Government Development Index (EGDI) in 2016 as compared to 2014. Notably, in 2016, there are more countries with very-high-EGDI values (i.e., EGDI values greater than 0.75). 29 countries scored “very-high-EGDI” values in 2016 and this group includes all 25 countries that had also scored very high EGDI in the last edition of the Survey (UNDESA, 2014).

Figure 5.1. Number of countries grouped by E-Government Development Index (EGDI) levels, in 2014 and 2016

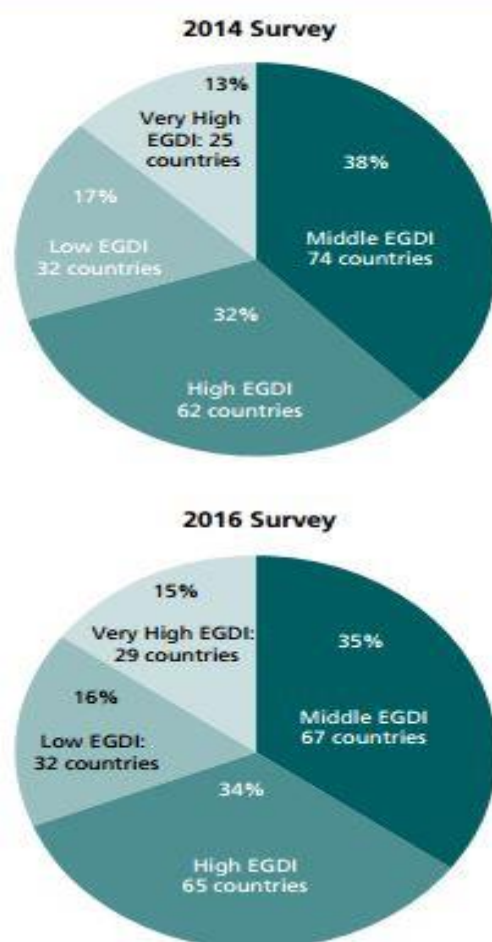


Figure 3: Number of countries grouped by E-Government Development Index (EGDI) levels, in 2014 and 2016

Source: United Nation’s E-Government Survey 2016

The four additional countries that joined this group of top performers are Slovenia (ranked 21st), Lithuania (ranked 23rd), Switzerland (ranked 28th), and the United Arab Emirates (ranked 29th). As seen in the 2014 Survey, the trend that leadership in e-government development is not solely dependent on the income level of a country (UNDESA, 2014). In

the second- (high-EGDI) and lower-tier (middle-EGDI and low-EGDI) some lower income countries perform as well as higher income countries, if not better in some instances.

Likewise, the number of countries with high-EGDI values (i.e., between 0.50 and 0.75) increased to 65, up from 62. While three countries (Antigua and Barbuda, Egypt and Fiji) dropped from high-EGDI to medium-EGDI, ten countries (the Bahamas, Bosnia and Herzegovina, Lebanon, the Philippines, Saint Kitts and Nevis, South Africa, Thailand, Trinidad and Tobago, Uzbekistan and Vietnam) improved their e-government performance and made the leap from middle EGDI to high-EGDI values (see Table 5.1). Meanwhile, the number of countries with middle EGDI values (i.e., between 0.25 and 0.50) declined from 74 to 67 countries.

Table 5.1. Countries grouped by E-Government Development Index (EGDI) levels in alphabetical order

Very-High-EGDI (Greater than 0.75)	High-EGDI (Between 0.50 and 0.75)		Middle-EGDI (Between 0.25 and 0.50)		Low-EGDI (Less than 0.25)
Australia	Albania	Mauritius	Algeria	Lesotho	Afghanistan
Austria	Andorra	Mexico	Angola	Libyan Arab Jamahiriya	Benin
Bahrain	Argentina	Monaco	Antigua and Barbuda (-)	Maldives	Burkina Faso
Belgium	Armenia	Mongolia	Bangladesh	Marshall Islands	Burundi
Canada	Azerbaijan	Montenegro	Belize	Micronesia (Federated States of)	Central African Republic
Denmark	Bahamas (+)	Morocco	Bhutan	Namibia	Chad
Estonia	Barbados	Oman	Bolivia	Nauru	Comoros
Finland	Belarus	Peru	Botswana	Nepal (+)	Congo (-)
France	Bosnia and Herzegovina (+)	Philippines (+)	Cambodia	Nicaragua	Côte d'Ivoire
Germany	Brazil	Poland	Cameroon	Nigeria	Democratic Republic of Congo
Iceland	Brunei Darussalam	Portugal	Cape Verde	Pakistan	Djibouti
Ireland	Bulgaria	Qatar	Cuba	Palau	Equatorial Guinea
Israel	Chile	Republic of Moldova	DPR of Korea	Panama	Eritrea
Italy	China	Romania	Dominica	Paraguay	Gambia
Japan	Colombia	Russian Federation	Dominican Republic	Rwanda	Guinea
Lithuania (+)	Costa Rica	Saint Kitts and Nevis (+)	Egypt (-)	Saint Lucia	Guinea-Bissau
Luxembourg	Croatia	San Marino	El Salvador	St Vincent & the Grenadines	Haiti
Netherlands	Cyprus	Saudi Arabia	Ethiopia	Samoa	Liberia
New Zealand	Czech Republic	Serbia	Fiji (-)	Senegal	Madagascar (-)
Norway	Ecuador	Seychelles	Gabon	Sudan	Malawi
Republic of Korea	Georgia	Slovakia	Ghana	Suriname	Mali
Singapore	Greece	South Africa (+)	Guatemala	Swaziland	Mauritania

Slovenia (+)	Grenada	Sri Lanka	Guyana	Syrian Arab Republic	Mozambique
Spain	Hungary	Thailand (+)	Honduras	Tajikistan	Myanmar
Sweden	Jordan	TFYR of Macedonia	India	Timor-Leste	Niger
Switzerland (+)	Kazakhstan	Trinidad and Tobago (+)	Indonesia	Togo (+)	Papua New Guinea
United Arab Emirates (+)	Kuwait	Tunisia	Iran (Islamic Republic of)	Tonga	Sao Tome and Principe
United Kingdom	Latvia	Turkey	Iraq	Turkmenistan	Sierra Leone
United States of America	Lebanon (+)	Ukraine	Jamaica	Tuvalu	Solomon Islands
	Liechtenstein	Uruguay	Kenya	Uganda	Somalia
	Malaysia	Uzbekistan (+)	Kiribati	United Republic of Tanzania	South Sudan
	Malta	Venezuela	Kyrgyzstan	Vanuatu	Yemen (-)
		Viet Nam (+)	Lao People's PR	Zambia (+)	
Australia				Zimbabwe	

Table 3 : Countries grouped by E-government Development Index (EGDI) levels in alphabetical order
Source: United Nation's E-Government Survey 2016

The above trend signals that more countries are advancing towards higher levels of e-government. They are responding to people's increasingly varied and complex needs, as well as the persistent call for new, better and faster public services. There is also growing recognition of e-government to support sustainable development in the three dimensions – economic growth, social inclusion and environmental protection.

3.5.4. Lack of e-services for disadvantaged and vulnerable groups compounds digital disparities

There has been progress in e-services aimed at disadvantaged and vulnerable groups. In 2012, the United Nations E-Government Survey assessed that 28 % of the national government websites contained specific sections on at least one of these groups; by 2014, 64 % of the national government portals and websites provided integrated links to sources of archived information (policies, budget, legal documents, etc.) related to disadvantaged and vulnerable groups, namely people living in poverty, persons with disabilities, older persons, women and young sectors in community. Understanding the connection between the increasing online opportunities and human wellbeing, many of the developed countries have a stated policy of e-inclusion of the disadvantaged and vulnerable groups in society which are generally the last to come on board the technology train. Cross country comparisons show evidence of this divide for the disadvantaged and vulnerable groups among

countries of the world. Countries with higher human development index pay greater attention to e-inclusion of vulnerable groups. Programs intended to build skills for the vulnerable groups have income - passed special ease-of-use 31 features for persons with disabilities, older persons, etc. In Africa, online services for is advantaged and vulnerable groups remains lower than in other regions, with only 4 % of countries offering services for the poor and the persons with disabilities. In Asia, the disabled and vulnerable group that receives most online services is the immigrants with 38 % of countries offering this service. Oceania has 14 % of countries offering services to the older persons, persons with disabilities and the immigrants. Services for the poor are available in 21 % of the countries in Oceania. Finally, in the Americas, 31 % of countries present services for the persons with disabilities and the older persons. (NATIONS, 2014)

Overview of online services for disadvantaged and vulnerable groups

Region	Services for poor	Services for persons with disabilities	Services for older persons	Services for Immigrants
<i>Per centage of total countries in the region</i>				
Africa	4	4	6	7
Americas	20	31	31	17
Asia	34	32	30	38
Europe	47	53	53	44
Oceania	21	14	14	14

Figure 4 Overview of online services for disadvantaged and vulnerable group

Source: United Nation’s E-Government Survey 2014

3.5.5. Regional development

The regional e-government developments in 2016 mirror those of previous Surveys. Figure 5.2 illustrates the gaps that have persisted in e-government development among regions during the period 2014-2016. A majority of countries in the very-high-EGDI group are from Europe, which comprises 19 out of 29 countries (66 per cent) in 2016, as compared to 16 out of 25 countries (64 per cent) in 2014; while at the other extreme, the low-EGDI group mainly consists of African countries. In fact, the statistics have remained unchanged for this low EGDI group, with 26 countries from Africa (81.2 per cent), 3 from Asia (9.4 per cent), 2 from Oceania (6.3 per cent) and 1 from the Americas (3.1 per cent).

Figure 5.2. Number of countries grouped by E-Government Development index (EGDI) level and geographical regions

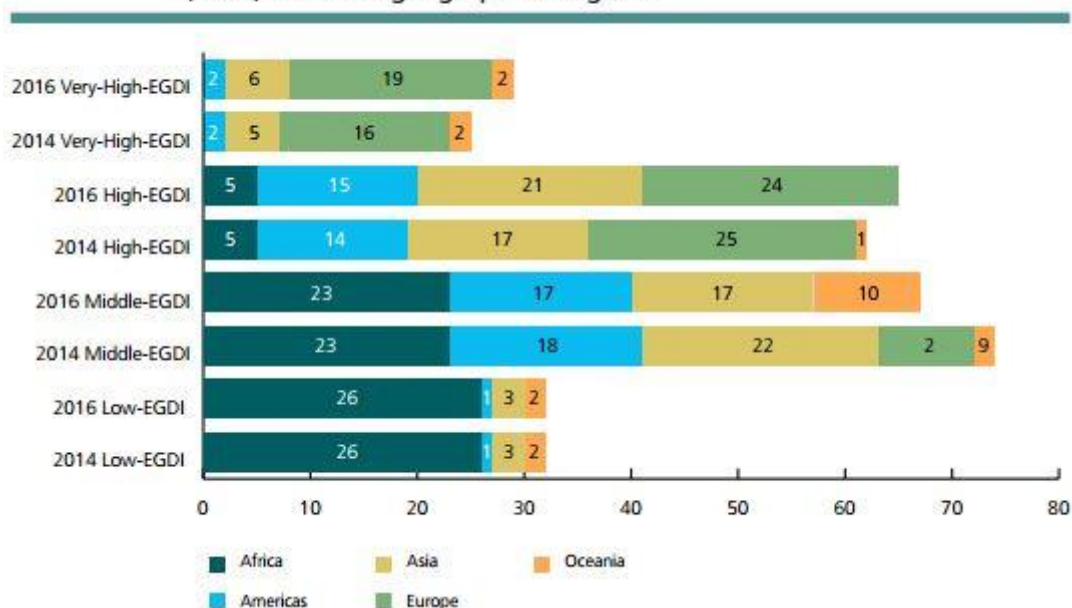


Figure 5: Number of countries grouped by E-Government Development index (EGDI) level and geographical regions

Source: United Nation’s E-Government Survey 2016

3.5.6. E-government in Africa

The world population is growing and it will be over nine billion in 2050 (UNDESA 2015b), the greatest increase is expected to occur in the poorest and most vulnerable regions, including Africa and the Arab states. In addition to pressing development needs, countries in Africa are disproportionately impacted by global challenges such as food security and climate change. Therefore, they have not been able to reap sustainable gains in e-government. For instance, in countries like Somalia (ranked 193rd), Chad (ranked 188th), South Sudan (ranked 183rd), and the Democratic Republic of Congo (ranked 180th), extreme and harsh environments have adversely affected development, and logically hindered progress and priorities related to e-government, with regression in some areas.

All other African countries are in the lower two tiers of e-government development (i.e., the low-EGDI and middle-EGDI groups) on e-government with high EGDI values are Mauritius, ranked globally at 58th, Tunisia at 72nd, South Africa at 76th, Morocco at 85th, and Seychelles at 86th.

Table 5.3. Top 10 countries for e-government in Africa

Country	Region	Sub-Region	OSI	HCI	TII	EGDI	EGDI Level	2016 Rank	
Mauritius	Africa	Eastern Africa	0.7029	0.7067	0.4596	0.6231	High	58	
Tunisia	Africa	Northern Africa	0.7174	0.6397	0.3476	0.5682	High	72	
South Africa	Africa	Southern Africa	0.5580	0.7253	0.3807	0.5546	High	76	
Morocco	Africa	Northern Africa	0.7391	0.4737	0.3429	0.5186	High	85	
Seychelles	Africa	Eastern Africa	0.4058	0.6861	0.4624	0.5181	High	86	
Cape Verde	Africa	West Africa	0.4565	0.6031	0.3629	0.4742	Medium	103	
Egypt	Africa	Northern Africa	0.4710	0.6048	0.3025	0.4594	Medium	108	
Botswana	Africa	Southern Africa	0.2826	0.6553	0.4215	0.4531	Medium	113	
Libyan Arab Jamahiriya	Africa	Northern Africa	0.1087	0.7588	0.4291	0.4322	Medium	118	
Kenya	Africa	Eastern Africa	0.5580	0.5169	0.1808	0.4186	Medium	119	

Figure 6: Top 10 countries for e-government in Africa

Source: United Nation's E-Government Survey 2016

3.6. E-Government in Ethiopia

3.6.1. Country profile

The Federal Democratic Republic of Ethiopia, the second- most populated nation in Africa following Nigeria, is a developing country which is in the horn of Africa. Bordered by Eritrea to north, Djibouti to the northeast, Somalia to the southeast, Kenya to the south and Soudan to the west, it is characterized by a wider range of ecological and climatic conditions. According to the Global demographic estimates and projections by the United Nations, the population of Ethiopia in 2016 is estimated to be about 99.4 million, which ranks 14th in the world. Agriculture accounts for half of the economy - gross domestic product (GDP) as well as 43% of the nation's exports, and 85% of the total employment.

The largest city and capital of Ethiopia is Addis Ababa or Addis Abeba, which has an estimated population of 3.6 million in the city proper and a metro population of more than 4.6 million. Being as old as two millenniums, its cultures and traditions hold family as a significant part of Ethiopian life, sometimes even surpassing the significance their careers or businesses might have.



Figure 7: Map of Ethiopia

Sources: Ethiopian Central statistics Authority

3.6.2. Major e-government activities in Ethiopia

E-Government has been utilized by developed and developing countries to be an empowering agent towards accelerating methods, conveying a large amount of services to public and organizations, expanding transparency and responsibility while decreasing the costs. Furthermore, in developing countries it has been perceived as an empowering agent toward catapulting governments into the twenty-first century while jumping different eras of innovation. It is in this light that the Government of Ethiopia has built the E-Government Directorate under the Ministry of IT. (Technology, 2005). Ethiopia, based on the 2008 UN E-Readiness index report, is ranking 172 from 192 countries scoring a total 0.1857 and distributed to 0.1739 in web measure index, 0.0040 in infrastructure index and 0.3796 in human capital index. Even so the status is far below the world average, the trends in improving towards these averages are encouraging. If we see the statistics of the last three evaluations, focusing only on web measure index, Ethiopia has scored 0.0154 in 2005, 0.1739 in 2008 and 0.20 in 2010. This institutes that the improvement in 2010 is far better than the previous years.

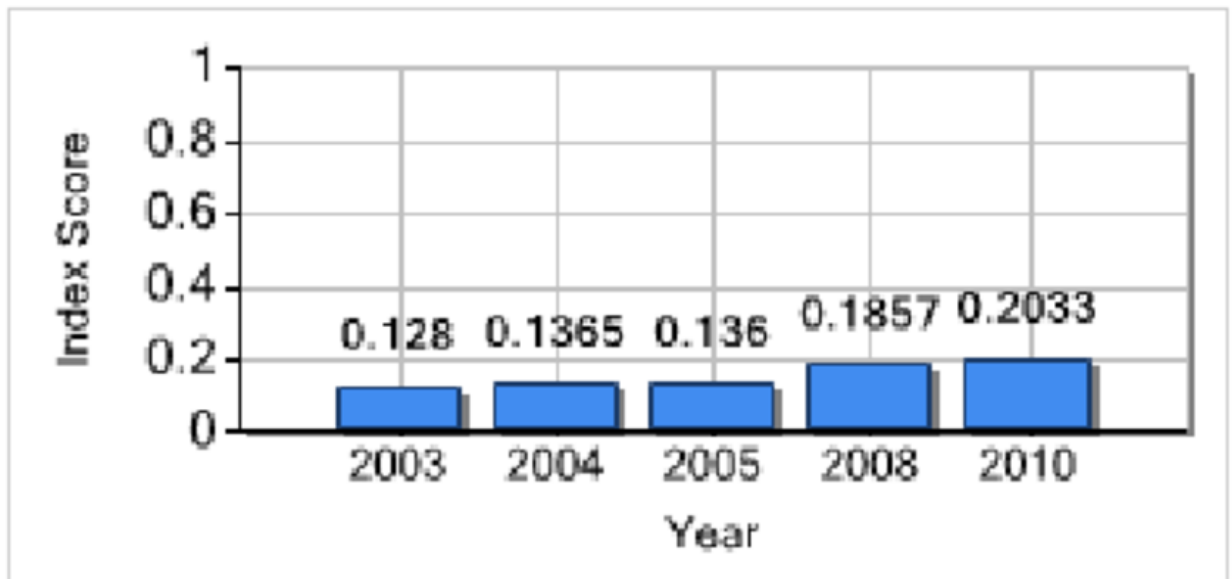


Figure 8 E-Readiness Index for Ethiopia

Source: UN Global E-Government Readiness Report 2005, from E- Government to E-inclusion, UNPAN/2005/14, United Nations publication

E-Readiness Index for Ethiopia

The initiatives that contributed to the above results are many and they are also diversified in nature. The major initiatives can be divided into infrastructure, application, standards/guidelines and human resource development.

- 1) Infrastructure, which is a backbone of E-government activities and capital intensive compared to other E-government activities,
- 2) Applications, which is automation of the process, data storages, data sharing, information exchange, service delivery, etc. in the government,
- 3) Standards & Guidelines which are to be used in implementing e-Government assignments (policies, strategies, etc.)
- 4) Human Resource Development, which is a major activity to produce ICT skill in specialized and general level.

3.6.3. Infrastructure

The Ethiopian Government is trying its best to bridge the digital divide that is of wide range in the country by investing huge money in Information and Communication Technology. The former Ethiopian Telecommunication Corporation (Ethio telecom) is a state owned company. Ethio telecom was managed, on a management contract arrangement from 2010 to 2013 June, by France Telecom, and was required to comply with Ethiopian Government orders and will propose a new structure for the company.

Although Ethiopia's telecom sector is still in its emerging stage of development compared to other countries in the world, the Government is investing a lot of money to improve the current situation. Public investment in Telecommunication Infrastructure and services is increased dramatically from US\$28 million in 2002 to US\$300 million in 2004, and currently an investment of US\$4 billion is planned for period 2007 to 2012.

Source: Ethiopian Telecommunication Corporation, Addis Ababa

Fixed-telephone subscriptions per 100 inhabitants	0.85
Mobile-cellular telephone subscriptions per 100 inhabitants	31.59
International internet bandwidth per Internet user (<i>Bit/s</i>)	5,002
<i>Percentage</i> of households with computer	2.80
<i>Percentage</i> of households with Internet access	2.85
<i>Percentage</i> of individuals using the Internet	2.90
Fixed (wired)-broadband subscriptions <i>per 100 inhabitants</i>	0.49
Active mobile-broadband subscriptions <i>per 100 inhabitants</i>	7.55

Table 4: ICT infrastructure in Ethiopia

Source: ICT Development Index 2015

3.7. Strategy

E-government strategy for Ethiopia has been designed, with a focus on facilitating effective delivery of government services to customers (residents, businesses and visitors). The strategy envisages implementation of 219 e-services comprising of 77 informational and 134 transactional services over a five-year period. The implementation is proposed to be done through 12 priority projects and service delivery would be through four channels (Portal, call center, Mobile devices and Common service centers) and delivery will be facilitated and strengthened through 6 core projects, including National Payment Gateway, Enterprise Architecture framework, Public Key Infrastructure, National Data Set, National Enterprise Service Bus and National Integrated Authentication Framework.

In addition – common applications which will horizontally cut across all ministries are proposed, which include initiatives like E-Procurement, Human resource Management System, E-Office, E-Mail and Financial management & Information System

The Strategy has been design keeping the following guiding principles of e-Government

- E-Government is focused in creating a SMART (Simple Moral Accountable, Responsive and Transparent) Government;

- E-government promotes causes of e-citizen and e-democracy;
- E-Government is not translating processes, however transforming processes;
- E-Government necessitates Capacity building within the Government;
- E-government aims networked and integrated government;
- E-government is citizen-centric;
- E-government provides multi-channel delivery of public services;
- E-Government aims in providing convenient access of information to all, and improving service access & delivery;
- E-Government enables development & participation of all segments of population to reap benefits of IT and participate in the Governance process and can voice their opinions more effectively; and
- E-Government supports in development and inclusion of Private Sector in public service delivery.
- The e-Government strategy has a customer-centric focus to facilitate the delivery of services and information through alternate channels in a manner that is convenient for the citizens and is in line with their expectations and aspirations. Life cycle based representation of services is a powerful tool towards this end and therefore, the strategy envisages the use of life-cycle events while electronically enabling the services. (Demeke Alehegne, 2014)

3.8. Key Success Factors

The government of Ethiopia should study e-government programs of some developed countries; it should also consider the lessons they learned from mistakes through IT projects of the government of Ethiopia. The following factors have been identified as the key factors for quick and successful implementation of e-government in Ethiopia.

Sponsorship should be top-level.

- All the ministries should make efforts and should have ownership and will to change.
- The government should have ability to convey and absorb.

- Rational approach & key structure for e-Government extends the nation over timely accessibility of funds.
- Solid connections between civil and private sector.
- Allowing amendments in laws, rules and strategies.
- Capacity of citizens to get and use public service provided through E-Government (Technology, 2005)

Ethiopian ministry of foreign affairs is one of Ethiopian government department which gives public services like visa services and document authentication. But when we see the services of visa application procedure, there is no any online platform to apply visa online. Due to this, visa application is a very labor intensive process which takes many days. So, the main aim or object of the thesis work arises from this unorganized and slow process, which can be minimized by providing online visa application platform.

3.9. Technologies

3.9.1. HTML5

HTML developed in 2007, and spearheaded by Google and Apple, HTML5 is the fifth revision of HTML (Hyper Text Markup Language) standard released in 2011 by World Wide Web Consortium (W3C). It is also supported by most of the major web browsers (Chrome, IE, Firefox, Opera, Safari) nowadays .HTML 5 is powering an entirely new generation of Internet experiences, both for broadband Internet and mobile Internet. Today there are 1.4 billion Internet users. However, due to the proliferation and adoption of mobile devices, by 2015 there will be more people accessing the Internet via a mobile device than the traditional Internet (Mary Meeker, Morgan Stanley 2010).

3.9.2. Cascading Style Sheets (CSS3)

Cascade Style Sheet or CSS is the key file that styles or designs all the HTML modules in a website. It allows the user to separate the website's HTML content from its style (Cssbasics.com, 2015). CSS2 was designed by W3C in 1998 and later further improved in 2011. CSS describes how the structured element must be rendered on screen, on paper, in speech, or on another media (Network, 2015).

3.9.3. PHP

PHP is a recursive acronym for PHP: Hypertext Preprocessor which is widely used as an open source server side scripting language. It has evolved dramatically over the years, notably adding a solid object-oriented model in PHP 5.0 (2004), anonymous functions and namespaces in PHP 5.3 (2009), and traits in PHP 5.4 (2012). PHP has a very complete set of object-oriented programming features including support for classes, abstract classes, interfaces, inheritance, constructors, cloning, exceptions, and more (Tatroe, et al., 2013).

What makes PHP different from other scripting languages such as JavaScript, is that the execution of the code happens on the server, which generates HTML which is further forwarded to the client. The client receives the result that the script has produced, but still cannot know what the actual code was. It is possible to configure the web server to consider all HTML files as PHP, so the possibility of users knowing the code equals to zero.

The PHP software works with the web server, which is the software that delivers web pages to the world. When you type a URL into your web browser's address bar, you're sending a message to the web server at that URL, asking it to send you an HTML file. The web server responds by sending the requested file. Your browser reads the HTML file and displays the web page. You also request a file from the web server when you click a link in a web page. In addition, the web server processes a file when you click a web page button that submits a form. This process is essentially the same when PHP is installed. You request a file, the web server happens to be running PHP, and it sends HTML back to the browser, thanks to the programming in PHP (Lockhart, 2015).

3.9.4. MySQL

The database management system that is used for hosting the database is MySQL, which is integrated into the local server WAMP, intended for development on local machines.

4. PRACTICAL PART

In this chapter, it will be clearly discussed the work of designing the web for “Ethiopian Ministry of Foreign Affairs (Ethiopian Immigration Authority)”. So at the end it will be able to make any user to reserve passport online. The reason behind the development of a web application of this type lies in possible benefits which can be gained through its usage.

For the study and data collection, survey study was conducted about Ethiopian Immigration Authority by email and from students who are currently studying in Czech Republic. The survey was done by preparing questioner (Annex 1) and distributing for clients directly by face and email. In this survey study questioner were distributed for 50 people and only 30 could respond. The finding from the survey indicates that entire participant had access to the internet, even if all of them were not regular users. Majority of the participant were never used any e-services in Ethiopia and the reason was that they couldn’t find appropriate e-service. As they described there are some e-services from the government of Ethiopia including commercial bank of Ethiopia, Ethiopian airlines and ministry of education but there is no passport service in Ethiopia. The main barriers which are described by the participant were like - lack of education and awareness, reliability and security, internet cost, low band width and political Issues.

Finally, all participants were agreed on the importance of e-passport service for Ethiopian Immigration Authority. The reasons which, they listed were easy accessibility, saving money and time.

Area	Findings N=30
Internet usage	All the participants had experience of internet. Over 70% of the participants use internet daily. The rest of the participants use it alternatively.
Barriers	Education and awareness, Political Issues, Reliability and Security, High Internet Cost, Low Bandwidth.
E-service essence and Usage	Every participant knows the importance of e-services and would like to have passport services The government is providing some services but all the participants would like to have more services as it would save their time and money.

Source: Author

Table 5 Summary of finding with survey Ethiopia current living in Ethiopia

4.1. Use case Diagram

The use case diagram is used in presenting the system requirements of any proposed system. A use case is a realistic description of the workflow of the system and it is used to explicitly describe the intentions and actions of users. The use case diagram, which presents the system requirements are used to show how the proposed system work in practice (Idow et al., 2014) The interaction between actor and use cases are also described using use case diagram.



Figure 9: Use case diagram

As it can be seen, on Figure 10, a new user will have the possibility of:

- Registering to gain more functionalities

A registered user will have a possibility of performing all actions that are available for unregistered user, but also he or she can:

- Login
- Book appointment
- Check appointment
- Cancel appointment
- View appointment
- Accept appointment
- Edit appointment

Administrator can perform all actions as other users, but he or she also has the possibility of:

- Log in with administrator credentials to unlock actions available for the administrator.
- Cancel appointment
- View appointment
- Accept appointment
- Approve appointment
- Edit appointment

4.2. Class Diagram

To show a theoretical structure of the database, and the functionality of the web application, a class diagram was created which shows how users interact with the data, and the structure of classes and their relationships.

Class Diagram

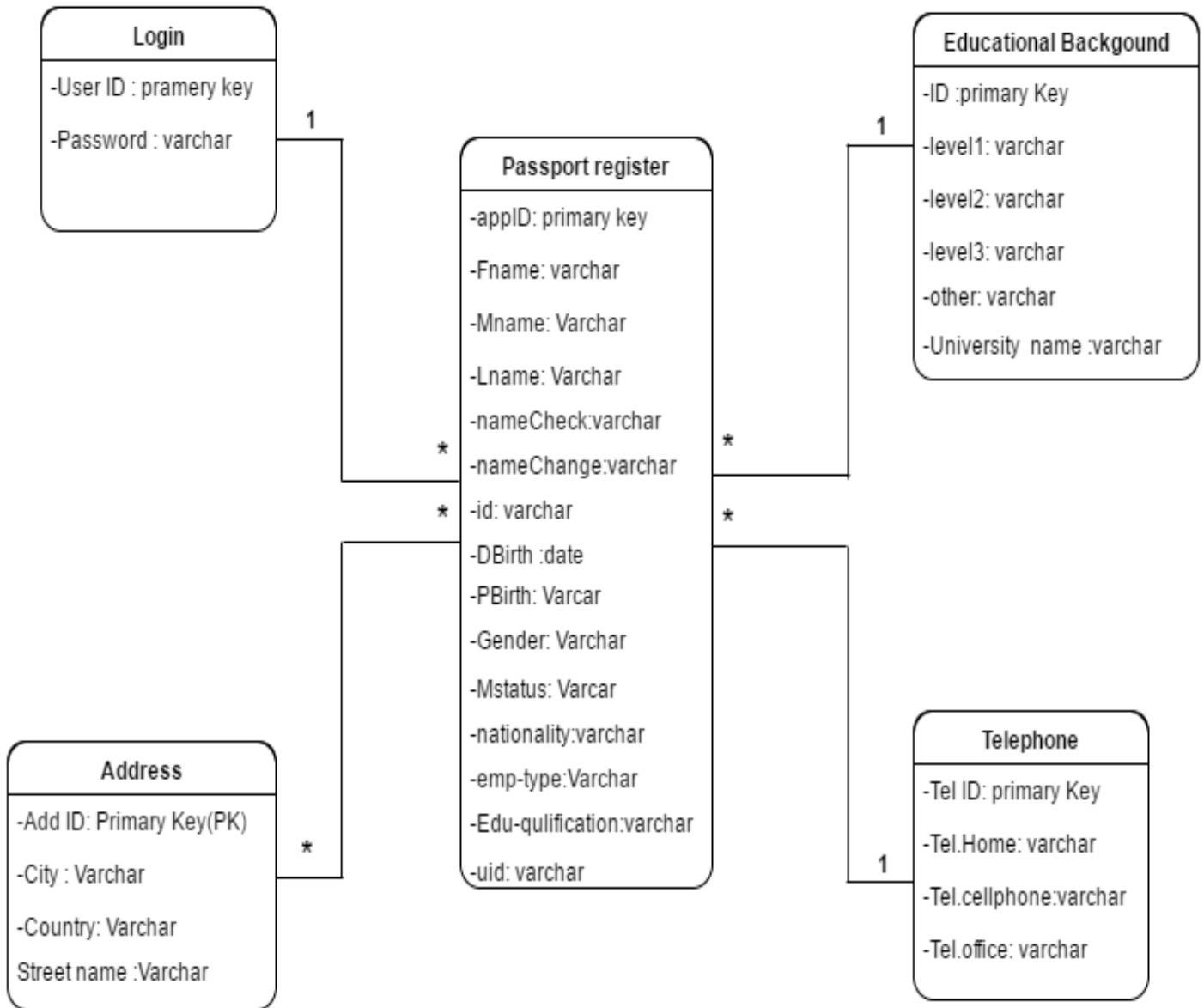


Figure 10: Class diagram of passport application

4.3. Sequence Diagram

A sequence diagram illustrates in a kind of format in which each object interacts via messages. It is generalization between two or more specification diagram.

New Registration:

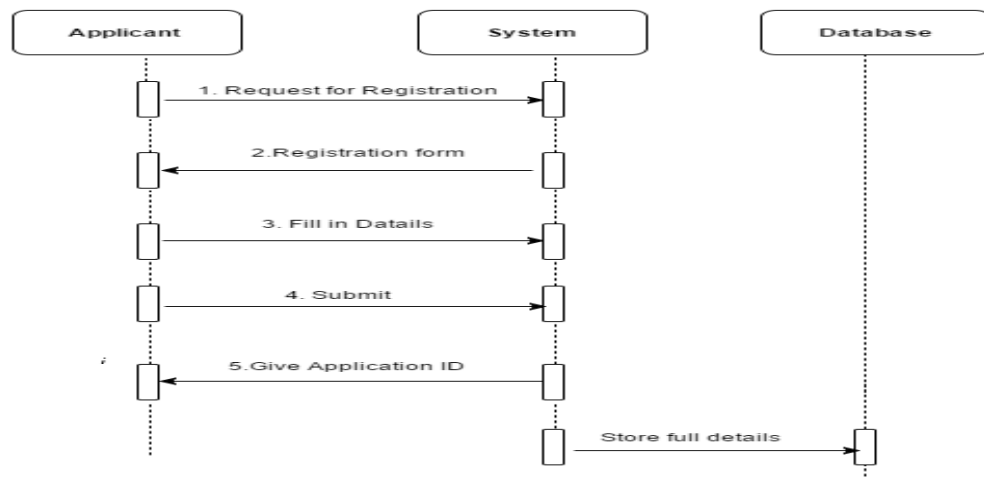


Figure 11: Sequence diagram

4.4. Web application

Web application was developed with use HTML for the development of front-end, the design and structure of the application. Because the application needs to communicate with the server, a server-side scripting language, PHP, was used to establish connection to the database, and to retrieve and insert the data into the database. Other functions which are written for the web application were also written in PHP. The database management system that is used for hosting the database is MySQL, which is integrated into the local server WAMP, intended for development on local machines.

4.5. Database – MySQL

For the beginning of the development of passport application, database creation was necessary to store all the data regarding the registered users. MySQL was the choice of database management system, as it comes prepacked with WAMP local server, on which the application is developed and tested. As seen in constructed class diagram (Figure 10), it was necessary to create tables that would store all the data.

The structure of tables is as follows:

➤ **Users:**

- Social Security ID – primary key(pk)
- Username – Varchar (50)
- Password – Char (50)
- FName – Varchar (50)
- MName – Varchar (50)
- Lname-Varchar (50)
- Name check- varchar (20)
- Namechange-varchar (20)
- DBirth: Date (50)
- Pbirth: varchar (50)
- Gender: varchar
- Mstatus:varchar (10)
- Nationality: Varchar (60)
- Emp-type:varchar (50)
- Edu-qulification: varchar (50)
- Uid : varchar(20)

➤ **Educational background:**

- ID – Integer; Identification for rows necessary for queries
- level 1- Varchar
- Level2 – Varchar
- level3 - Varchar
- other –varchar

- university name – Varchar
- **Address**
- Add ID- primary key
- City – Varchar
- Country - Varchar
- Street name –varchar
- **Telephone**
- Tel ID- primary key
- Tel.Home – Varchar
- Tel.cellphone - Varchar
- Tel.office –varchar

The following figures show SQL queries that produce the database and tables with the above-mentioned structure:

```
--
-- Table structure for table `passportregister`
--
CREATE TABLE IF NOT EXISTS `passportregister` (
  `appid` timestamp NOT NULL DEFAULT CURRENT_TIMESTAMP,
  `fname` varchar(50) NOT NULL,
  `mname` varchar(50) NOT NULL,
  `lname` varchar(50) NOT NULL,
  `namecheck` varchar(20) NOT NULL,
  `nameChange` varchar(20) NOT NULL,
  `id` varchar(20) NOT NULL,
  `dob` date NOT NULL,
  `pob` varchar(50) NOT NULL,
  `gender` varchar(10) NOT NULL,
  `mstatus` varchar(20) NOT NULL,
  `nationality` varchar(150) NOT NULL,
  `employment` varchar(50) NOT NULL,
  `edu` varchar(20) NOT NULL,
  `uid` varchar(11) NOT NULL,
  PRIMARY KEY (`appid`),
  KEY `uid` (`uid`)
) ENGINE=InnoDB DEFAULT CHARSET=latin1;

--
-- Dumping data for table `passportregister`
--
```

Figure 12: SQL query for creation of 'passport register' table

```

--
-- Table structure for table `users`
--

CREATE TABLE IF NOT EXISTS `users` (
  `appid` varchar(11) NOT NULL,
  `user_name` varchar(8) NOT NULL,
  `password` varchar(40) NOT NULL,
  `type` enum('user','admin') NOT NULL DEFAULT 'user',
  PRIMARY KEY (`appid`,`user_name`)
) ENGINE=InnoDB DEFAULT CHARSET=latin1;

--
-- Dumping data for table `users`
--

INSERT INTO `users` (`appid`, `user_name`, `password`, `type`) VALUES
('ahtjem01810', 'ahtjem01', '22d53e9a6634a6415d1e1aac940fb76f', 'user'),
('tojahm01625', 'tojahm01', '22d53e9a6634a6415d1e1aac940fb76f', 'user');

--
-- Constraints for dumped tables
--

```

Figure 13 SQL query for creation of 'users' table

4.6. Front End

Before retrieving the data from the database, and displaying it to users of the web application, it was important to create a layout and structure for the application. This was done using HTML5, CSS, and JavaScript. Furthermore, a CSS framework called Bootstrap was used in development process to make it faster and simpler. Bootstrap comes with premade styles for layout and HTML elements, which is very useful for agile development. First sections which were created are the static sections of the web application.

These include:

- Header – navigation section
- Home page
- News page
- Contact Us page
- Login/ signup page

Header section was the first section to be developed. It contains the logo and the navigation bar.



Figure 14: Header section of Passport Application

Because the index page which is presented to the user first, contains the most important part of the web application, it will be described in later sections of this diploma thesis.

In the navigation section, we have buttons to access other parts of the web application.

These are:

- Home page – some information about Ethiopia and Addis Ababa
- News page – where news page form provides resent news
- Contact page – Where contact form is present in case users have question with phone, Fax, E-mail regarding passport reservation
- Log in and Sign up page – which opens a form for logging in

This code has created a nice layout for our needs and user satisfaction



The Federal Democratic Republic of Ethiopia (FDRE):

The Federation is composed of Nine States (killil): Tigray, Afar, Amhara, Oromia, Somali, Benishangul-Gumuz, Southern Nations Nationalities and People Region (SNNPR), Gambella and Harari Regional States; and two Chartered Cities - Addis Ababa and Dire Dawa. The national regional states and the two city administrative councils are further divided into eight hundred woredas (districts) and around 15,000 kebeles (neighborhoods, the lowest level of elected administration).

Addis Ababa

one of the two chartered cities in the Federation, is the seat of the Federal Government and is also the capital of the Oromia Regional State. It is the largest city in the country with a population of 2.7 million at the 2007 census (estimated at 3.2 million in 2011). It lies on the central plateau at an altitude of 2300-2400 meters, and with an average temperature of around 160C.

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Figure 16 Display of 'Home 'page

4.6.2. News page

This page was developed second, to provide some news about Ethiopia and Ethiopian Immigration Authority. the following code presents a snippet of a news form

```
</div>
<div id="body">
  <body>
    <p>
      Ethiopia adopted a new constitution that established the Federal Democratic Republic of Ethiopia (FDRE) in 1995.The federal government is responsible
    </p><p>The federal state is headed by a constitution president and the federal government by an executive prime minister who is accountable to the cot
    </p><p>The Federal Democratic Republic is composed of states which are delimited on the basis of settlement patterns, language, identity and consent
    </p>
  </body>
</div>
```

Figure 17 HTML code of 'news' page

The following figure shows the final appearance of news page



Figure 18: Display of 'new' page

4.6.3. Contact page

This page was developed third, to provide address, phone number office hours and call center and map (location)

```
<body>
  <div class="login" height="60%">
    <h6>    Contact  </h6>
    <p>Address  : Addis Ababa ,Ethiopia</p>
    <p>phone    : +251-0115517345</p>
    <p>Office Hours    Monday - Friday  9:00am - 5:30pm </p>
    <p>call center     Monday - Friday  8:30am - 8:30Pm </p>
  </div>
  <div align="left" class="newuser">
    
  </div>
</body>
</div>
```

Figure 19: HTML code of 'contact us' page

The following figure shows how finished contact us page looks like. Describe how they can help solve their visitors' problems.

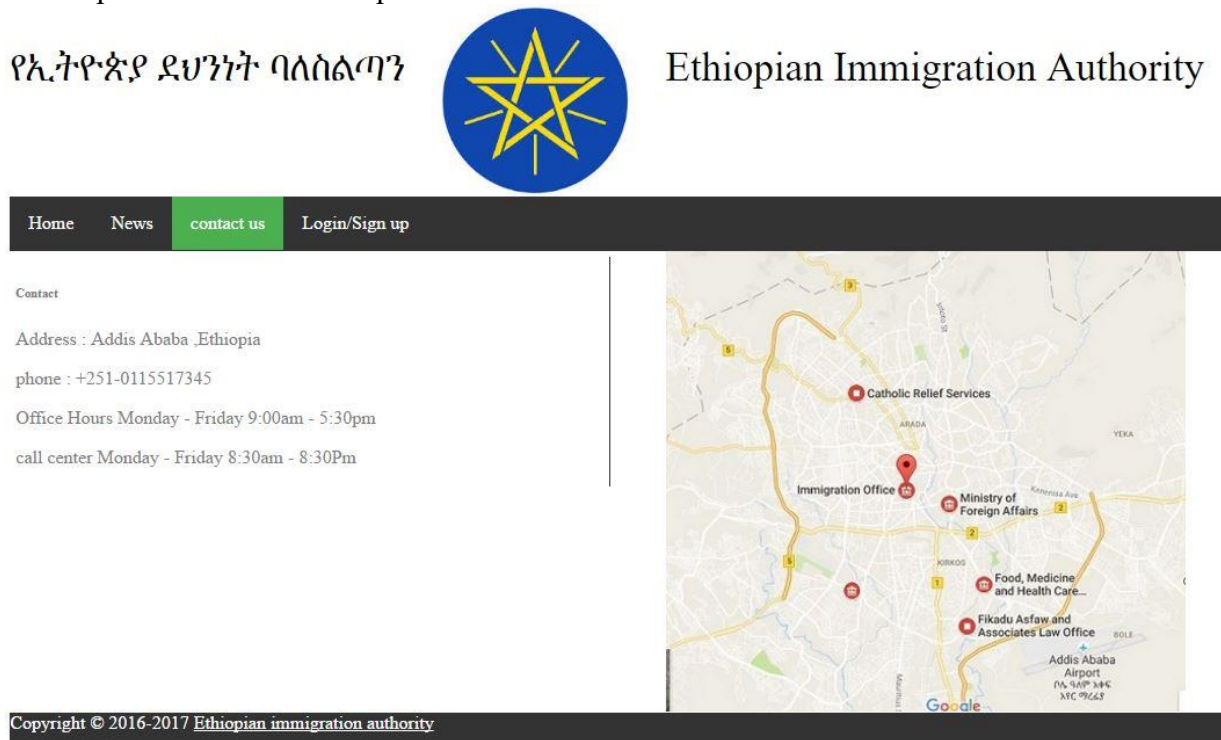


Figure 20 Display of 'Contact us' page

4.6.4. Login and Sign up page

This page was developed fourth, to provide simple login and signup for passport application (reservation).

The following code presents a snippet of a login and signup form.

```

<body>
<!-- login form for existing user-->
<div class="login">
<p> If you have created an account with us please login using you username and password to track, cancel or edit your application.
if you have unsubmitted application, you can complete and submit it after login </p>
<form name="login" method="post" action="login.php">
<p>User Name :<input type="text" name="login" value="" placeholder="ID" required</p>
<p>Password :<input type="password" name="password" value="" placeholder="Password" required</p>
<p class="submit"><input class="submit" type="submit" name="commit" value="Login"></p>
</form>
</div>

<!-- New user area-->
<div class="newuser">
<p> If you do not have created an account with us please use the following form to create an account. Please take a note of your user name and
if you have unsubmitted application, you can complete and submit it after login </p>
<form name="newaccount" method="post" action="createaccount.php">
<p>User Name :<input type="text" name="login" value="" placeholder="ID" required</p>
<p>Password :<input type="password" name="password1" value="" placeholder="Password" required</p>
<p>Confirm password:<input type="password" name="password2" value="" placeholder="Password" required</p>
<p class="submit"><input class="submit" type="submit" name="commit" value="Create"></p>
</form>
</div>

</body>
</div>

```

Figure 21: HTML code of 'login and signup 'page

The following figure shows the final appearance of Login / Signup page



Figure 22: Display of 'login /Signup' page

Code that was previously shown creates the “Login and signup passport application” section of the about page. As it can be seen, login and signup page with input fields for Username and Password and User can also create new account with new username and password.

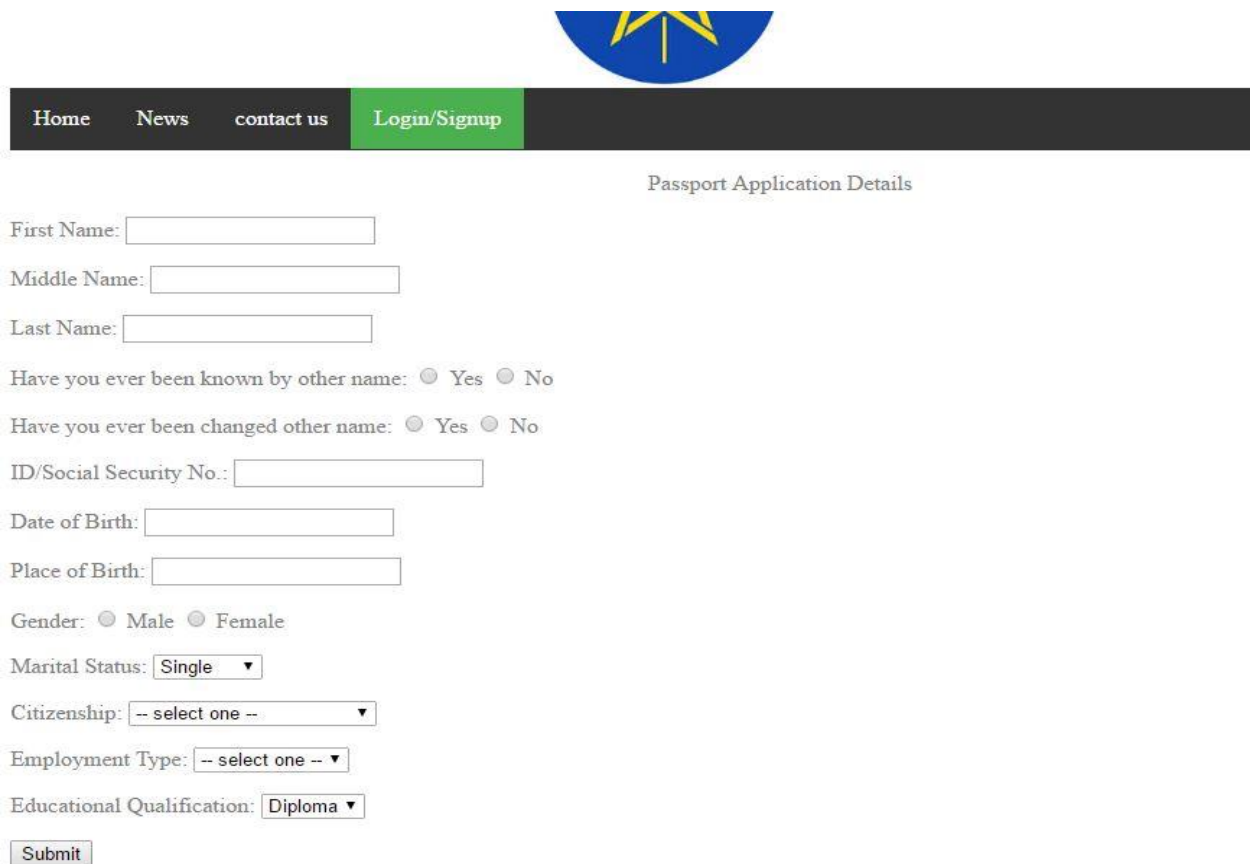
4.6.5. Passport registration Details

There is need for every new applicant to register before they can access the system, a user must have a username and password which they will use to log in before they can book for the passport appointment. Any applicant that does not register will not be allowed to access passport registration Menu because to log in to the registration Menu requires a username and a password.

```
</div>
<div id="body">
  <body>
    <p align="center" class="style6">Passport Application Details </p>
    <form name="form1" method="post" action="Passportregister.php">
      <p>First Name:
        <input name="fname" type="text" id="fname">
      </p>
      <p>
        Middle Name:
        <input name="mname" type="text" id="mname">
      </p>
      <p>Last Name:
        <input name="lname" type="text" id="lname">
      </p>
      <p>Have you ever been known by other name:
        <input name="namecheck" type="radio" value="Yes">
        Yes
        <input name="namecheck" type="radio" value="No">
        No</p>
      <p>Have you ever been changed other name:
        <input name="nameChange" type="radio" value="Yes">
        Yes
        <input name="nameChange" type="radio" value="No">
        No</p>
      <p>ID/Social Security No.:
        <input name="id" type="text" id="id">
      </p>
      <p>Date of Birth:
        <input name="dob" type="text" id="dob">
      </p>
      <p>Place of Birth:
        <input name="pob" type="text" id="pob">
      </p>
      <p>Gender:
        <input name="gender" type="radio" value="Male">
        Male
```

Figure 23: HTML code of 'passport application details' page

The following figure shows the final appearance of Passport application details page



The figure shows a web page for passport application details. At the top, there is a navigation bar with links for Home, News, contact us, and Login/Signup. Below the navigation bar is a header area with the text "Passport Application Details". The main content area contains a form with the following fields and options:

- First Name:
- Middle Name:
- Last Name:
- Have you ever been known by other name: Yes No
- Have you ever been changed other name: Yes No
- ID/Social Security No.:
- Date of Birth:
- Place of Birth:
- Gender: Male Female
- Marital Status:
- Citizenship:
- Employment Type:
- Educational Qualification:

At the bottom of the form is a button.

Figure 24: Display of “passport application details “page

The user has an option to register to passport application or reservation to additional information to register; a registration page has been created. The user is presented with a registration form, which, when filled properly, checks whether the user already exists. If not, the user is registered and can proceed to log in. And fill all passport application Details after the user submits a passport application form

4.7. Back End

In the development of back end for passport registration developed to provide meaning for the front-end elements that were created. Server-side scripting language, PHP was used to create connection between the web application and the database that was developed. Furthermore, PHP was used to communicate with the database regarding the retrieval of data from the database, and insertions of data such as data created by registration form, or form for reporting a passport application.

The back end was done for needs of the passport registration form that will be labeled and a registration page was created that would take the input from the user. And later, other aspects of the web application, such as registration and login procedures will be explained in detail.

To start retrieving the data from the database, a connection with the database needed to be established. The connection was created with the use of PHP. The following figure represents the code that achieved this task.

```
<?php
define('DB_SERVER', 'localhost');
define('DB_USER', 'root');
define('DB_PASSWORD', '');
define('DB_DATABASE', 'dbpassport');
$con=mysql_connect(DB_SERVER,DB_USER,DB_PASSWORD) or die("Failed to connect to MySQL: " . mysql_error());
$db=mysql_select_db(DB_DATABASE,$con) or die("Failed to connect to MySQL: " . mysql_error());
```

Figure 25: PHP connection to the database

4.7.1. Login and signup

The primary function of the passport application is available to all its visitors, and to view application. The user should can apply passport application, so that the database of registration stays up-to-date.

First, a login and signup page was created that would take the login and signup for the user, regarding the passport application



Home News contact us **Login/Signup**

If you have created an account with us please login using you username and password to track, cancel or edit your application. if you have unsubmitted application, you can complete and submit it after login

User Name :

Password :

If you do not have created an account with us please use the following form to create an account. Please take a note of your user name and password if you have unsubmitted application, you can complete and submit it after login

User Name :

Password :

Confirm password:

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Figure 26: Login/ Signup page

Following figure shows a part of HTML code that login and sign up the passport registration form.

```

<body>
<!-- login form for existing user-->
<div class="login">
<p> If you have created an account with us please login using you username and password to track, cancel or edit your application.
if you have unsubmitted application, you can complete and submit it after login </p>
<form name="login" method="post" action="login.php">
<p>User Name :<input type="text" name="login" value="" placeholder="ID" required></p>
<p>Password :<input type="password" name="password" value="" placeholder="Password" required></p>
<p class="submit"><input class="submit" type="submit" name="commit" value="Login"></p>
</form>
</div>

<!-- New user area-->
<div class="newuser">
<p> If you do not have created an account with us please use the following form to create an account. Please take a note of your user name and
if you have unsubmitted application, you can complete and submit it after login </p>
<form name="newaccount" method="post" action="createaccount.php">
<p>User Name :<input type="text" name="login" value="" placeholder="ID" required></p>
<p>Password :<input type="password" name="password1" value="" placeholder="Password" required></p>
<p>Confirm password:<input type="password" name="password2" value="" placeholder="Password" required></p>
<p class="submit"><input class="submit" type="submit" name="commit" value="Create"></p>
</form>
</div>

</body>
</div>

```

Figure 27: HTML code for login and signup page

As is can be seen, the form calls action from “loginsignup.php”.the file contain PHP code that handles for login and signup page

```

</div>
<div class="login-help">
  <?php
    if (isset($_SESSION['ERROR'])) {
      if($_SESSION['ERROR'] == true){
        echo '<p>WRONG ID OR PASSWORD, PLEASE RETRY<p>';
        $_SESSION['ERROR'] = false;
        session_unset();
      }
    }

    if (isset($_SESSION['CREATED'])) {
      if($_SESSION['CREATED'] == true){
        echo '<p>Account created now you can login!<p>';
        $_SESSION['CREATED'] = false;
        session_unset();
      }
    }
  ?>

```

Figure 28: PHP code that login and Signup

The codes written above shows that validation process of log in and sign up fields and checks the username is already in the database. If it is, the function returns an error.

Passport Registration

```

<?php
session_start();

if (isset($_SESSION['user_name']) ) {
  echo "
    <div class='analyst'>
      <div class='welcome'>Welcome , " . strtoupper($_SESSION['user_name']). "!</div>
      <div class='logout'><a href='logout.php' title='logout' style='color:rgb(0,0,0)'>Logout</a></div>
    </div>";
}
else{
  header("location: index.html");
}

$fname = $_POST['fname'];
$mname = $_POST['mname'];
$lname = $_POST['lname'];
$namecheck = $_POST['namecheck'];
$nameChange = $_POST['nameChange'];
$id = $_POST['id'];
$dob = $_POST['dob'];
$pob = $_POST['pob'];
$gender = $_POST['gender'];
$mstatus = $_POST['mstatus'];
$nationality = $_POST['nationality'];
$employment = $_POST['employment'];
$edu = $_POST['edu'];
$uid = $_SESSION['appid'];
// Database connection
$servername = "localhost";
$username = "root";
$password = "";
$dbname = "dbpassport";
// Create connection

```

Figure 29: PHP code that passport registration

4.7.2. Platforms

During the development of the application I have tried to stick to open source utilities so that it can act as a proof of concept to the government, that e-Services can be implemented with low cost. The followings are lists of language, database and web server used during the development.

PHP: 5.5.10 3.

Apache HTTP server: 2.4.7 4.

MySQL: 5.6.16 5.

WAMP Server: 2.4 6.

NeatBeans IDE 7.4

4.7.3. Server Configuration

Web application needs to be hosted to make it available to the public via Internet or it can be accessed locally in specific location via Intranet. In both cases the minimum requirement for the server that will host the service should be as follows

Apache Version: 2.4.23

PHP Version: 5.6.25

MySQL: 5.6.16 5.

Server Software: Apache/2.4.23 (Win64) PHP/5.6.25 - Port defined for Apache: 80

PhpMyAdmin supports a wide range of operation on MySQL. Used to managing databases, tables, columns, relation, indexes, users, permissions, etc.

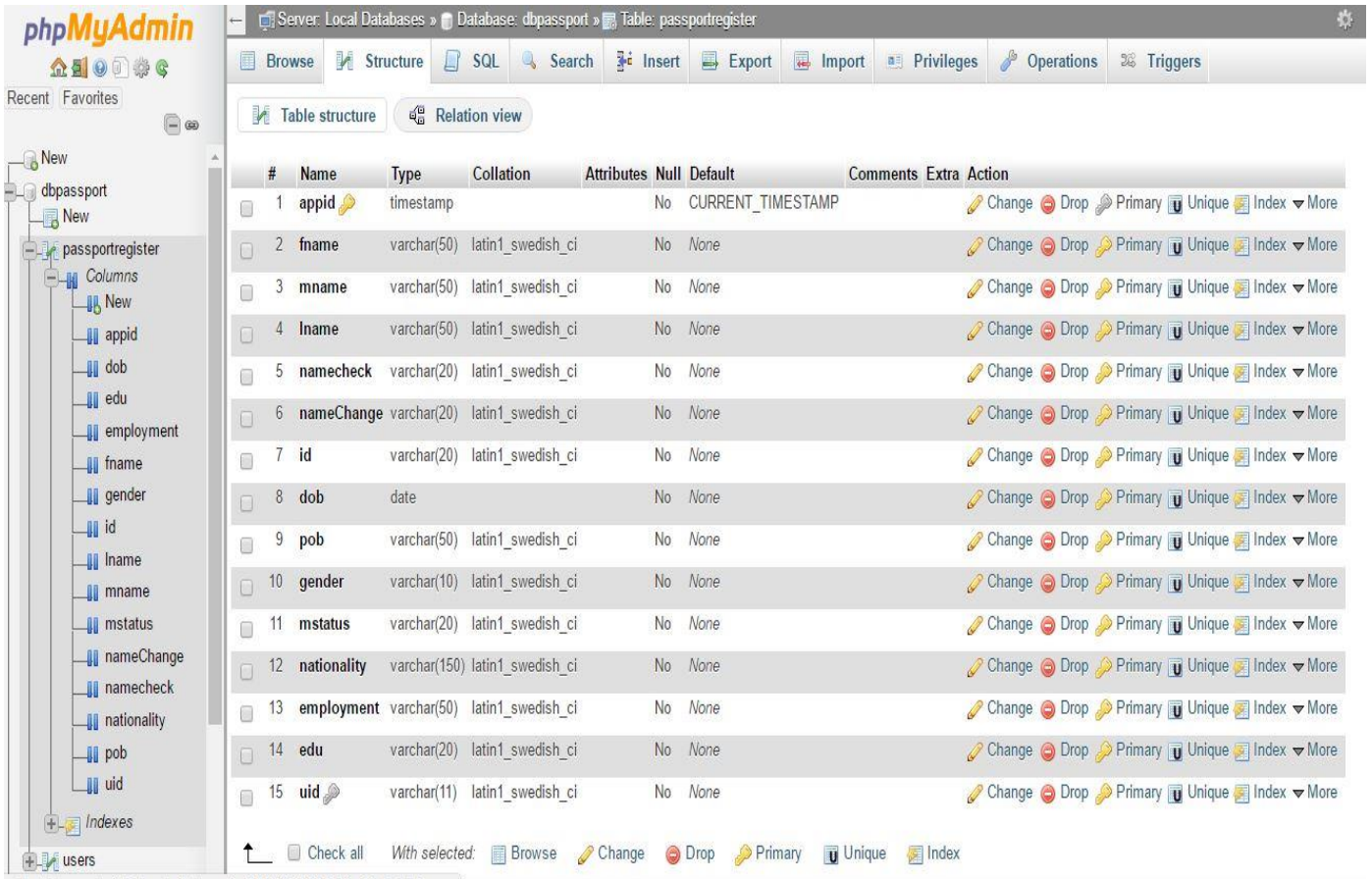


Figure 30: PhpMyAdmin with databases and tables

5. Results and Discussion

The practical part provided description of the whole development process of e-passport registration application with all obstacles that occurred. It captured the whole process with description of tools and utilities used. The design of the application was also conducted by the developer, which prolonged the development process. Even with a single developer, the application was created approximately within five weeks thanks to application of various technologies.

The research achieved the objectives set by analyzing the weaknesses of the current immigration system in Ethiopian Ministry of Foreign Affairs (Ethiopian Immigration Authority) Addis Ababa. In addition, the author made a design of a new online public passport registration form which provides an efficient interface to utilize e-immigration services on the same portal. As part of partial goals the author characterized the current state of online public services and e-government readiness which is done through survey and based on the secondary resources.

Ethiopian government lacks infrastructure and skills. The government doesn't invest enough money in this field. There are other priorities such as construction development which can be seen by eyes like bridges and roads and huge buildings. The government doesn't show any interest in online services and the reason can be said that the bureaucrats don't want the system to get better. They don't want to facilitate the process as people/clients want to it be or as it is required. Bureaucracy is a major problem that could benefit the bureaucrats while impeding the governing system. While most of the developed world has managed to solve or at least reduce this threat, developing countries such as Ethiopia have not yet implemented the system accordingly.

The government should have clear intentions in mind as to introducing more facilitated services. The government must invest more money in this field. The government must educate people and employees. In the first phase, the government should train its employees. Even though employing the trainers will be costly for the government, it should hire them and give them complete freedom to design these services. These services provide continuous support and one of the keys for these services are transparency and reliability.

6. Conclusion

The main goal of the diploma thesis was to analyze the weaknesses of the current immigration system in Ethiopian Ministry of Foreign Affairs (Ethiopian Immigration Authority) Addis Ababa and to design online public service.

The passport registration system (e-government system) designed as a web service could benefit the public in a variety of ways, some of which are discussed below. The major advantage is the time it saves citizens and customers of the ministry of Immigration agency. The fact that this system can be accessed from anywhere in the world via the internet makes it far easier for people from the furthest locations to make use of the service without travelling long distances there by saving them the hustle and money they would have spent. In the view of the government itself, once then system is implemented, it could economical since it cuts down the number of employees required to process these tasks. The current trend is that some rent seekers stay in line in the morning to sell their place for an expensive price to those who need it badly. This has been an opportunity created by the long waiting queues. The Author believes that the system which is designed will ultimately abolish these embezzlements.

Although the internet connectivity in the country has been increasing from time to time, it is far beyond reaching a 100% accessibility rate. Considering this, the author of this thesis understands that the web service could not be accessed from very village in Ethiopia. But being able to access the system from rural towns, by itself, is a major advantage to the users as compared to having to travel to the capital probably three to four times until the whole process is complete.

Author, strongly believes that, this research will help to improve e-government services in Ethiopia and author would like to focus another poor area of e-government services by another research.

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8. Appendix

Appendix

I Personal Information

1. Gender: Male Female
 2. Age: -----
 3. Educational Status-----
 - a. Primary Level_____
 - b. Secondary Level_____
 - c. Certificate_____
 - d. College Diploma_____
 - e. Degree and above_____
 4. Telecommunications Access
 5. 1 Do you have a mobile phone?
 - a. Yes_____
 - b. No_____
- Internet and PC Usage
- 5.1 Do you have experience in using PC?
 - c. Yes_____
 - d. No_____
 - 5.2. Do you have experience in using the internet?
 - e. Yes_____
 - f. No_____
 - 5.3. What is your connection type?
 - A. Dialup
 - B. Broadband
6. Have you even used any e-government services?
 7. Which services do you use the most?
 8. Have you applied for passport by e- services before? A. yes B. No
 9. If “No” why?
 10. Do you think applying for passport online is important? A. yes B. No
 11. If yes (Question 9). Why do you think it is important?
 12. Would you like to recommend something to your country’s e-government services?
- *** Question for Ethiopian Immigration Authority
13. What ICT infrastructures are available in your institutes?
 14. Does your organization have its own website?
 15. Does your organization have online passport registration system?