A Quick Comparison of E-Government Systems of Estonia and Turkey

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1 Introduction & Motivation

Humans need cities and governments to evolve. With the growing world population, it becomes harder for governments to provide services to its citizens and control them at the same time. Along with the rapidly evolving technology, the governments are required to cope with these newly created needs of its people. These are the reasons why e-governance and e-governments are rapidly evolving in the last decade, simple because of necessity.

One of the things that made Estonia popular worldwide in last few years is the electronic services the government provides: mainly E-Residency program. This program and many other E-services are all thanks to Estonian e-government infrastructure advancements.

The reason why the author has decided to write this paper is that the author is a citizen of Republic of Turkey and also a resident of Estonia Republic. The author has used both systems, especially for citizenship registry, health, employment, tax and company services.

The goal of this paper is to briefly compare Turkish and Estonian E-government systems. This paper is written for 2017-2018 term Social and Ethical Aspects of IT course.

The reason why the author has decided to write this paper is that the author is a citizen of Republic of Turkey and used most of its e-government services. The author also have been living in Estonia with a residence permit for more than a year and had the chance to use most of the essential and basic services as a citizen does. Is improves the quality of this research higher and makes it more suitable for real life practical scenarios when these services are compared by an active user.

The services used mostly are related to citizenship registry, health, employment, tax and company services.

2 Definitions

E-government: The use of electronic communications devices computers and the Internet to provide public services to citizens and other persons in a country or region [1].

E-governance: E-government is defined as the use of technology to enhance the access to and delivery of government services to benefit Citizens business partners and employees [2].

Often these terms are used in each others place. Table 1 summarizes more about practical differences between E-governance and E-government.

TABLE 1
Government versus Governance. Source: [3]

Government	**Governance**
Superstructure	Functionality
Decisions	Processes
Rules	Goals
Roles	Performance
Implementation	Coordination
Outputs	Outcomes
E-Government	**E-Governance**
Electronic Service delivery	Electronic consultation
Electronic Workflow	Electronic controllership
Electronic Voting	Electronic engagement
Electronic Productivity	Electronic societal guidance

2.1 Parties of E-government

E-government is always between a government body and a party which consumes the service government provides. Following are parties of e-governments.

- G2C — Government-to-citizen (a.k.a. C2G)
- G2G — Government-to-government, information sharing between institutions
- G2E — Government-to-employees
- G2B — Government-to-businesses/commerces

3 About Countries

Since governments and their e-governments depends on the citizens who are using it, it is essential to understand some basic data about both countries. The population is a big factor here: smaller the population, faster the services can be tested and implemented and less the complexity is. Another metric is internet penetration. A summary comparison table can be found below. Data source: Eurostat [4] [5].

Criteria	Estonia	Turkey
Population	1.3 million	78 million
Area	45.226 km2	783.562 km2
Household internet access	%85	%75
Weekly internet access	%85	%75
Online public auth.	%80	%35
Downloading forms	%40	%15
Uploading forms	%90	%25

4 E-government Systems Summary

4.1 E-Estonia

This table from E-Estonia website summarizes a timeline of services introduced as a part of E-Estonia. Estonia is either first or one of the first countries to implement most of these services including electronic taxation, voting, blockchain and online residency. As mentioned above, the separate architecture of E-Estonia provides more flexibility on releasing different features at different times with much less complexity.

Year	Service	Description
1997	e-Governance	99% of public services available
2000	e-Tax	95% of tax claims, paying and filing
2001	x-Road	G2G
2001	Digital ID	Auto-connected G2G
2005	i-Voting	Takes 3 minutes
2007	Public safety	ER & location detection
2008	Blockchain	Used in health, judicial, security
2008	e-Health	Patient portal
2014	e-Residency	Services for non-residents

4.2 E-Turkey

Year	Service	Description
2000	TC Kimlik	Citizen IDs since 1800s
2006	turkiye.gov.tr	Govt. authorized private Turksat
2008		Announced & started being used

The reason why the table above has not much details or rows is that E-Turkey depends heavily on providing those services on one portal and integration of these departments are done one by one, thus making the progress slower, less transparent and harder to track and measure. This table also shows that some services were introduced in Turkey sooner than Estonia but as of 2018 Estonia digitized much more of their services.

5 Comparison

5.1 National Identification Number

Since a governments main functionality, main members and reason of existence depends on its citizens, both physically or digitally, it became mandatory to provide a certain type of coding system to identify citizens and distinguish between them. This identification system is called a National Identification Number, whose standards changes in almost all the countries in the world.

5.1.1 Estonia

11-digit Estonian ID Code (isikukood) was first introduced in 1989 and updated in 1990 with the standardification ID codes ENV VST 585:89 and EV ST 585:90. Latest version is EVS 585: 2007 [6] which was published in 2007 as the name suggests.

It can support up to 10 million population or 40 million E-residents [7] according to the current demographics.. It has been noted that after the E-residency program is introduced, amount of combination of numbers will become insufficient. Because of how the verification digits (digits 8-10) work, theoretically it doesnt have to be unique and thus this uniqueness is provided via other control mechanisms.

It was designed to be an identifier only and was never designed to be secure, unlike U.S.As Social Security Number. The only data which is not private is the birth date (digits 2-7) and the gender (1st digit).

The algorithm (1st digit) -which indicates the century which a person was born in- suggests that Estonian ID codes are generated for people born on or after 1901.

Pros:

- Easy to memorize
- Was never planned to be private information, providing security

Cons:

- Limited supply, might need to change in the future, especially after E-residency program
- Some people may not want to disclose their birth date

5.1.2 Turkey

11-digit Turkish ID Code (TCKN - Turkish Republic Identity Number) was first introduced in late 90s. The government planned and completed creating first ID numbers in 1999 and announced to public in 2000 [8].

9 digits are used for citizenship and 2 digits for verification, giving one billion combinations. However in real life its less: digits 1-3 are province and city first registered, digits 7-9 are first registered district or village and digits 4-6 are registration order number, thus limiting numbers in bigger cities and districts. However it could be anticipated that with current 80 million people population, current population growth and current demographics there wouldnt be a scarcity of numbers.

It doesnt include any private information. However initially it was not designed to be a public information and created many security problems. These problems was not caused by the ID number system but how the systems like e-government and private sectors used this ID number. Some institutions and services like package delivery and Taxation treated this number as private and allowed some services to be used only with this number, however some other institutions and services treated this as a public ID and required additional identification like non-disclosed personal details or a type of password authenticate. This non-standardized usage created confusion and security flaws for many years. This issue was resolved by making ID number as a public number de-facto and always requiring

Fig. 1. Estonian ID Card

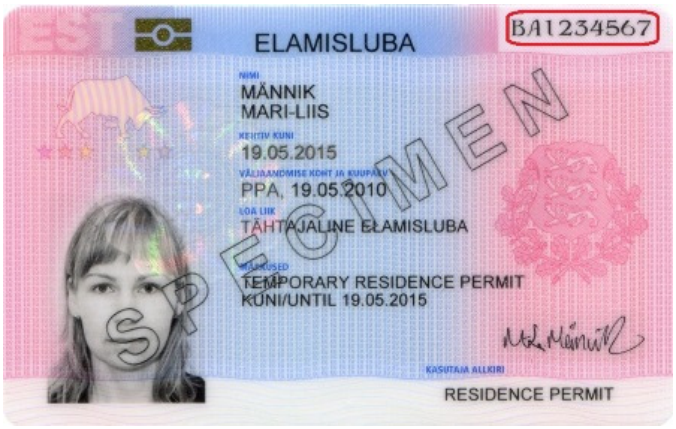

Fig. 2. Estonian Residence Card

an authentication.

Pros:

- Contains almost no personal information

Cons:

- Was never planned to be private or public information

5.2 ID Cards

An ID card is used not only to identify a citizen in real life, but with the increasing usage of e-government and other digital systems, it is also a way to identify them on the internet.

5.2.1 Estonia

There are no ID card standards in European Union thus Estonia has its own design. However its characteristics are almost the same with any other ID card, especially Estonian ID card (Figure 1) for this case. There is a photo, Smart Card and personal information on the front and machine readable passport-like code on the back.

The biggest advantage of this card is that the smart card comes with a certification service so authentication and signing services can be used right away.

Like all Schengen states, Estonia also offers a residency card to all its residents with at least Temporary Residence Permit. Estonia Residence card (Figure 2) design is exactly the same as of other Schengen states.

Pros:

- Smart card certificate is included and integrated
- Can be used as a drivers license

Fig. 3. Turkish ID Card

- Non-citizens are given a card and can access E-Estonia services
- Almost all citizens has it

Cons:

- Cannot be used as a travel document outside EU

5.2.2 Turkey

Turkey started ID card3 as a pilot program in 2007 in Bolu province but started distributing to citizens from other cities in 2017. The information on the card is very similar to Estonian one, with small differences:

- The photo is on the left
- Smart card is on back side of the card
- Back side includes travel card information

When compared to Estonian ID Cards, pros are:

- Can be used as a travel document for supporting countries (10 as for 2018)

Cons:

- Non-citizens are not given a digital card and cannot access E-government services
- Cannot be used as a driving license
- Smart Card does not contain Digital Signature and it needs to be bought separately Only 20 percent of the population received a card

5.3 Authentication and Personal Identification

This section provides information and comparison about how a citizen or a resident can authenticate and access to E-government services, mainly E-government portals.

To login to E-Estonia, one needs to Either have a MobileID or Card and their PIN number. PIN-1 is used for authenticating and PIN-2 is used for signing, which is required for doing any kind of change or application.

Both E-Estonia and E-Turkey support logging in through internet banking. Also both systems support allowing someone else to access some services.

E-Turkey also supports logging in with a password which provides a less secure but faster access to services. When this login method is used, one can use the portal read-only only.

E-Turkey has also official mobile application to provide services much easier and much faster.

5.4 Infrastructure

The biggest difference between two systems are how the services and their subservices are connected. E-Estonias main portal (eesti.ee) includes a limited number of services on its own and for other services the user redirected to other portals. While in E-Turkey, much more services are integrated to single main portal (turkiye.gov.tr) and the remaining services are hosted outside.

Estonian e-government systems also has X-road, which is a distributed network for interconnecting government institutions (G2G). When a service or information is created or updated, it automatically notifies and updates corresponding services and institutions using X-Road.

E-Estonia advantages:

- Flexible service structure for better growth
- X-Road does many things automatically.

E-Turkey advantages:

- Much faster access to services through single portal

5.5 Services

As there are many services, it will be the subject of a much longer article or research to compare most if not all the services of both countries. Below are comparison of five selected services with their respective advantages or disadvantages for each country.

Taxation is very advanced and complete in E-Estonia. Almost all the tax related operations can be done online. However Turkish e-tax system mostly provides services about debts and how to pay them.

Health portals for Estonia are using multiple websites and not all services are included in any of these portals like an official service to search for a family doctor. On the other hand it includes health data of a citizen provided by not only government health institutions but also from private institutions, which is a feature Turkey does not provide yet. Turkish health system has one official portal that allows the user to access all services from one place.

As for citizen related services, Estonia provides some essential services that Turkey does not currently provide. These services are: noitemsep

- Informing about a childs birth
- Marriage and prenup agreements
- Wills

However Turkey also has some interesting services in this field that Estonia doesnt. These services which are introduced recently are ancestor and marty search. Turkish government assigned a national ID to all the citizens born back to 1800s from the records they have retrieved and translated from Ottoman Empire, which makes these two services possible.

As for last there could not be found any non-government (private company) services in official portals. The reason for this could be because E-Estonia provides extensive APIs to 3rd parties and developers so e-services can be integrated to many different solutions. However currently E-Turkey does not provide a public API and 3rd party integration is done only by integrating ones service directly on the E-Turkey platform. Currently E-Turkey has 10 private telecommunication companies services included.

5.6 Security

There are no big security flaws or incidents happened at any E-Estonia services to date. The most famous one is that on August 30, an international team of researchers informed the Estonian Information System Authority (RIA) of a vulnerability potentially affecting digital use of Estonian ID cards issued since October 2014 [9]. Experts found a security flaw in the chip the ID used that makes it possible for bad players to impersonate and steal the identities of all 760,000 affected individuals.

However its Turkish correspondent witnessed several security attacks,major leaks and other security problems in the past. Two famous examples from these security incidents are as follows.

In 2003, root certificate provider Turktrust 's at least one of the intermediate certificates was used for man-in-the-middle (MITM) traffic management of domain names that the customer did not legitimately own or control, mainly Google services [10]. These certificate authorities are able to verify any certificate, even an illegally forged one. They were accused of intentionally forging some certificates and even distributing them. The company license was suspended for almost a year and reactivated after serious security checks and precautions were made.

In 2016, an anonymous hacker group (not the famous hacker group called Anonymous) leaked Turkish citizenship database, which is a MySQL or PostgreSQL database dump file including data of 50 million citizens of Turkey. The data included was genders names, address, birth information, father/mother name and ID numbers. It is later to be found that the source of the leak was an SQL Injection to the Voting authority [11].

6 Conclusion

Both countries has advantages over each other, but Estonia has more integration, compatibility and bigger space and flexibility for future growth. Even though Estonia started some services much earlier than Turkey, it can be seen that the systems designed in a more solid and stable way. Turkey took years to release some of their services out of pilot program and there were still problems on how those services are operated.

One of the factors that change the services and service quality is the country population. How many people living in a country changes the development, testing and integration speed as well as usage ratio. Estonia has more advantage on developing a better and more services than Turkey. However, more population also means more number of users, test cases and feedbacks and that might be the reason why E-Turkey is easier to use since all the services are integrated inside the portal and much easier to use.

Another factor especially for what services are more important to citizens are the cultural and other needs and the effect of this factor can be seen clearly on citizen-related services.

Finally, both countries do still need more integration on the private sector.

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