

# Comparative Analysis of the Government ICT Projects in Macedonia, Estonia and Slovenia

Smilka Janeska-Sarkanjac

Ss Cyril and Methodius University in Skopje, Macedonia  
Faculty of Computer Science and Engineering  
smilka.janeska.sarkanjac@finki.ukim.mk

**Abstract.** This comparative analysis of the government ICT projects of Macedonia, Estonia and Slovenia faces and compares the projects in the three countries. All three countries have similar size, similar historical and socio-economic background, but Estonia and Slovenia are significantly ahead in the development of information society and in economic development in comparison to Macedonia. Our thesis is that part of this successful economic development is due to the government initiative and decisions regarding the choice and implementation of ICT projects (infrastructural and e-government). We have found six crucial preconditions for development of ICT that have tangible impact on economic growth: government is the leader in introducing information society; government is early adopter of ICT; government is proactive; government recognizes ICT as growth tool; government provides the funding; government provides quality project management.

**Keywords:** ICT for development, ICT application, ICT projects, public sector, Macedonia, Estonia, Slovenia

## 1 Introduction

The proper application of ICT should lead to the people's wellbeing and raising of the level of empowerment and participation. Technology must be applied with sensitivity to social, economic, and political contexts [8].

The question whether ICT investments contribute to the economic growth had a vague answer for a long time. The well-known Solow's productivity paradox 'You can see the computer age everywhere but in the productivity statistics' [18] started to resolve in the early 2000s. There have been a number of macroeconomics studies demonstrating the positive impact of ICT on economic growth and development, conducted on the data from developed countries [19, 4, 14]. On the other hand, most of the authors arrived at negative or mixed results regarding economic growth or returns to capital for developing countries [5, 16, 17]. More recent research started to indicate positive economic returns to ICT investment for developing countries also [9] and ICT driven returns to productivity gains momentum [15].

For example, Hosman, Fife and Armey have found that a 100% increase of ICT expenditure per capita produces an additional 9% increase in the growth rate [9]. An-

other important ICT segment, especially for underdeveloped countries, penetration of mobile phones, has contributed significantly to economic growth. Fuss, Meschi and Waverman [19], looked at 92 countries, both developed and developing, to estimate the impact of mobile phones on economic growth for the period 1980 to 2003. They found that a 10% difference in mobile penetration levels over the entire sample period implies a 0.6% difference in growth rates between otherwise identical developing nations.

These recent macroeconomics researches do prove that ICT investments lead to economic growth, but to gain insight into how ICT can contribute to the development of a country, we need a better understanding on the way ICT is adopted, how ICT funds are employed, or distinguish the characteristics of specific projects that make them likely to succeed, and make them catalysts for economic growth.

There is strong evidence that e-government reforms are more likely to be a top-down process rather than a result of citizen demand, even in highly developed countries as USA [21]. In the case of developing countries, this is even more emphasized, because of the modest number of e-services offered by the private companies, and underdeveloped awareness of their advantages. This puts even more responsibilities in the hands of governments of developing countries.

Important obstacle in introducing ICT in a developing country is the resistance of political or business elites against new technologies. It is argued that new technologies could be extremely disruptive. They sweep aside old business models and make existing skills and organizations obsolete. They redistribute not just income and wealth but also political power [1]. The political-business nexus of the socialist regime elite that held power in the transition considered the introduction of new technology a threat. New technology brings transparency and empowerment to the citizens, which is not acceptable.

There are lots of questions concerning the challenges a government confronts in its effort to find the proper ICT strategy. One of the fundamental questions in formulating an ICT strategy for development in a country is what kind of project a government should choose to develop. We will try to offer some of the answers by comparing the most important ICT projects in Macedonia, Estonia and Slovenia. Besides that, we will consider nine horizontal enablers defined by EU Directorate General for Information Society and Media as infrastructural elements that provide foundations for robust, streamlined and sustainable e-government services [6].

Our thesis is that the factors that led to the differences in economic development of the three countries are twofold: (1) historical legacy and geo-political circumstances (path-dependence), including relatively different social, economic and political context and (2) "subjective" factors that largely depend on the decisions made by the governments. We will focus on the government decisions regarding the ICT projects (infrastructural and e-government) run by the governments in the three countries, and the other factors we will hold constant for the purpose of this research.

## 2 Basic Information

Macedonia, Estonia and Slovenia are of similar size and have a similar history – all of them were established as independent states after the fall of communism: all of them

were subject to a socialist planned state economy, more or less lacked private initiative, and experienced the transition from socialism to capitalism.

Slovenia and Estonia, unlike Macedonia, were the most economically developed regions in their former federal states (although Slovenia was at a considerably higher level in this regard), with geographical proximity to Western Europe: Slovenia borders Austria and Italy while Estonia has a maritime border with Finland [2]. Macedonia was one of the least developed regions in former Yugoslavia, and its neighboring countries were also not as developed. Karch [11] states that geographical proximity has played a traditional role in explaining policy diffusion, at least until recently.

Some of the basic data for the three countries are shown in Table 1.

**Table 1.** Estonia, Slovenia and Macedonia, basic data, 2010

<b>Criteria</b>	<b>Estonia</b>	<b>Slovenia</b>	<b>Macedonia</b>
Area	45,000 km <sup>2</sup>	20,273 km <sup>2</sup>	25,713 km <sup>2</sup>
Ethnic groups	Estonian 69% Russian 25,5% Others 5,5%	Slovenes 83,1% Serbs 2,0% Others 14,9%	Macedonian 64,2% Albanian 25,2% Others 10,6%
Population	1,333,000	2,018,000	2,056,000
GDP	\$19,083 billion (2010) \$3,965 billion (1995)	\$49,158 billion (2010) \$14,386 billion (1995)	\$9,300 billion (2010) \$3,400 billion (1995)
GDP growth	3,1%	1,2%	0,7%
GDP per capita (PPP)	\$18,518	\$28,030	\$9,727
Unemployment rate	5% (2008) 16,9% (2010) 11% (2011)	7,5% (2008) 10% (2010) 12% (2011)	35% (2008) 32% (2010) 31,3% (2011)
Education expenditure	4,9%	4,95%	4,42%
Expenditure on R&D	1,44%	1,86%	0,2%

Estonia, in less than 20 years, has become one of the leading countries in Eastern Europe. The Estonian economy has experienced almost double-digit growth for years (i.e. 11.74% in 1997, 9.974% in 2000, 7.516% in 2001, 10.562% in 2006), which applies that it was one of the fastest growing economies in the world, until the world crisis in 2008. Today it successfully copes with the effects of the crisis and achieves positive growth rates again. Much of this success of Estonia is due to the application of ICT, which plays an important role in the country.

Slovenia, in comparison to Estonia, experienced modest growth rates, but the starting position, at the beginning of 1990s was much better than ones of the other two countries. The highest growth rate was in 2007, 6,873% and the lowest was in 2009, -8,129%. During 1990s and 2000s, the average growth rate was 3,44%. Because of its good starting position (and traditional openness and trade with the West countries), Slovenian economic, social and political developments have been stable and relatively successful (its exports amount 60% of GDP), maintaining the biggest GDP in the region - despite having lower economic growth. Slovenians speak many languages (proficiency in English is one of the highest in the EU) and they are also prone to learning new technologies [3].

Macedonia, in comparison to Estonia, has experienced modest growth rates in the past 20 years, from negative ones in the beginning of the 1990s (i.e. -7,5% in 1993), to the highest one, 5,9% in 2007. In comparison to Slovenia, the starting position of

Macedonia in 1990s, with GDP about four times lower than Slovenia's was also rather unfavorable.

According to the research undertaken by the World Economic Forum on the use of information technology in 142 countries [20], Estonia ranks 24th in the Networked Readiness Index and it is the highest-ranking Central and Eastern European country. Slovenia takes 37th place, and Macedonia takes 66th place.

### 3 ICT projects in Estonia

At the beginning of the 1990s, when Estonia regained its independence, it was relatively a technologically backward country. The industrial machinery from the Soviet era was outdated, and state infrastructure in terms of institutions and people had to be built up from scratch. However, foreign direct investments started coming to Estonia. Krull [12] states that crucial factors supporting the development of Estonian information society and growth were:

- Building modern telecommunication infrastructure;
- The Tiger's Leap project and Estonian Educational and Research Network, back in 1993, provided schools with computers and Internet, from which generations of advanced ICT users rose, bringing their knowledge and their habits to their families, therefore producing a spillover effect;
- Early adoption of regulation related to information society;
- Introduction and the raising of public awareness for government programmes such as e-government, Village Road, x-Road, ID cards, etc.;
- The collaboration among the government, private companies and NGOs for various ICT programmes, such as the Tiger Leap programme.

According to many analyses, the government was the leader in introducing information society in Estonia, together with a pro-active ICT sector and advanced ICT user population. The business sector and NGO followed when they found their own interest in ICT projects run by the government. The most successful projects run by the government are the following [7]:

- Electronic ID card, which is used by almost 90% of the population. It serves as an identity document and as a travel document within the EU. It serves as a pass to almost every e-service in Estonia, to e-banking, e-elections, buying transportation tickets, e-taxes, e-education, e-health, etc.
- Mobile phone applications – m-parking, m-ticket for public transport, m-banking.
- E-taxes – Estonia's tax board offers online a pre-completed tax form, which enables easy and fast submission of taxes by citizens and companies. In 2011, over 93% of the income tax declarations were presented via e-tax system.
- E-elections – since 2005, Estonians, among the first countries, have been given the opportunity to vote via Internet, using the ID card or mobile phone as identification. In the 2011 parliamentary elections 24.3% of the people who voted used the e-voting system.
- E-business registration – full e-service for a registration of a new company.

- E-banking – bank sector was a fast follower to the introduction of information society by the Estonian government with the e-banking project. It was widely accepted, and currently 98% of the bank transactions are received through e-banking.
- E-ticket for the public transport is paid via Internet and is registered on the citizen's personal ID card.
- Digital prescriptions – integral information system that keeps record of the medical prescriptions in a central database, and enables patients to get their prescribed medicine in a pharmacy only with an ID card. It was launched in January 2010.
- E-health record – medical information system started in 2010, which contains information on diagnoses, doctor's visits, tests, treatments, prescribed medications etc. There is a patient portal that can be accessed with patient's ID card.
- E-school – since 2003, parent-teacher communication is facilitated with the portal e-School for all Estonian schools. The grades of the students can be tracked, their absence from classes, the content of their lessons etc.
- University via Internet – the results from the state exams are kept in an information system, together with the high school grades. Students may submit applications to universities via the state's internet-based application system, using the former data.

Important factor in developing e-services was early introduction of X-Road (2001), the data exchange layer of the state information system, which included a complex security solution: authentication, multi-level authorization, a high-level log processing system, encrypted data traffic with time stamps, a warning system for servers against cyber attacks etc. An important principle applied from the very start of the X-Road is its service-oriented architecture. Besides basic 20 e-services, in 2008 Estonia had over 800 e-government services for citizen and companies, being second after Austria in EU in terms of fully electronic services, according to the Capgemini survey [10]. All the common horizontal enablers, according to EU Directorate General for Information Society and Media, are available in Estonia, as one of six leading EU countries.

#### 4 ICT projects in Slovenia

With 95% full online availability of e-government services Slovenia is above the EU average of 82% [6]. Slovenia develops its e-government services according to EU recommendations, focusing on 12 services for citizens and 8 for businesses, which are defined as priority ones:

- Income taxes: declaration, notification of assessment – there is prefilled tax declaration for taxpayers as in Estonia, but they cannot use their ID card for authentication and authorization, but a qualified certificate issued by any registered certification authority in the country.
- Job search services by labor offices – there are two online job search services, by Employment Service of Slovenia and by the Ministry of Public Administration.
- Social security benefits –online processing of unemployment benefits, child allowances, medical costs (reimbursement or direct settlement), student grants. Not all of the social benefits are available online.

- Personal documents: passport and driver's license – there is information on the application process and email reminders on the expiration date of passports; otherwise the process is conducted in traditional manner. Renewal of a driver's license is a full online service that includes paying online, and receiving the new driving license by post. This e-service holds one of the lowest grades regarding online sophistication scores in the country - 50 out of 100 in 2010.
- Car registration (new, used, imported cars) – full online service.
- Application for building permission– full online service.
- Police report (e.g. in case of theft) - Since 2004, citizens can report crimes to the police online. Authentication with a qualified digital certificate is required. Since 2009, an anonymous denunciation of corruption to the Police has been enabled.
- Public libraries (availability of catalogues, search tools) - full online service that contains over 3 million bibliographic records, with a booking system.
- Certificates (birth and marriage): request and delivery - full online service that can be used by all residents equipped with qualified digital certificates.
- Enrolment in higher education/university – online application.
- Announcement of moving (change of address) - users need to send the electronically signed application form together with requested enclosed documents.
- Health related services (interactive advice on the availability of services in different hospitals; appointments for hospitals) – information services. Lowest ranking grades regarding online sophistication scores in the country – 32/100 in 2010.
- Social contributions for employees – full online service.
- Corporate tax: declaration, notification – full online service, same as for citizens.
- VAT: declaration, notification – full online service.
- Registration of a new company – full online service.
- Submission of data to statistical offices – full online service.
- Customs declarations – full online service.
- Environment-related permits (incl. reporting) – mainly informational web sites, some electronic services for obtaining environment-related permits.
- Public procurement - portal was established in 2007. It supports prior information notice, contract notice and contract award notice, as well as their amendments, tender documentation and relevant questions, answers and explanations. In 2009 the portal was upgraded with an additional platform for e-Submission, e-Tender evaluation and e-Auctions.

Besides these 20 e-government services, there are about 600 additional e-services in the country. Out of 9 measured horizontal enablers, 6 are available in Slovenia. These are: E-ID, Authentic Sources, Secure e-Delivery, Architecture Guidelines, Catalogue of Horizontal Enablers and E-Payment. The following enablers are not yet in place: Single Sign on, E-Safe and Open Specifications.

## 5 ICT projects in Macedonia

In 2005, the Republic of Macedonia has established the portal [Uslugi.gov.mk](http://Uslugi.gov.mk) as the single point of access to information and services of the government. The portal is a

result of the government's efforts to create a more efficient and transparent administration by presenting all available services for both citizens and businesses to the public. The assessment of the 10 basic services recommended by EU, and offered by the Macedonian government is as follows [13]:

- Income taxes: declaration, notification of assessment – there is no prefilled personal tax declaration for tax payers as in Estonia and Slovenia. Companies may pay the taxes online. Since 2012 there is also an online form of e-taxes for citizen. The percentage of tax declarations presented via e-tax system is very small, because of the small number of owners of the qualified certificate issued by registered certification authority in the country.
- Job search services by labor offices – there are two institutions in this field, Employment Service Agency and Administration Agency. The former one offers online submission of the data of new employments and the termination of employments, and the latter one offers online information on job openings and online job application. No other online services are offered.
- Social security benefits – other than online application for student dormitories, loans and grants, there is no other e-service regarding social security benefits. At best, there are information and downloadable forms for the social benefit.
- Public libraries (availability of catalogues, search tools) - online service that contains over 500 000 bibliographic records on book and non-book materials in Macedonian libraries.
- Health related services – G2B information on required documents or downloadable forms, no G2C online services. Information system on e-health record is under construction, health e-cards are being distributed to patients currently.
- Social contributions for employees – full online service.
- Corporate tax: declaration, notification – full online service.
- Registration of a new company – full online service.
- Customs declarations – Single Window for Export/Import licenses and tariff quotas system (EXIM) is online. Construction of the integral Customs information system with online services in progress.
- Public procurement - Public procurement is one of the most advanced part of e-services in Macedonia. Portal was established in 2007, and it is a one-stop-shop for public procurement in the country, which streamlines complex procedures and facilitates interaction between businesses and government institutions. It is also compliant with the European Union Directives and supports all forms of public procurement, including electronic auctions. Public institutions and businesses register with the system and obtain the obligatory digital certificates for posting tenders or sending bids. Since January 2008, e-Auctions have also become part of it.

The other 10 basic e-services recommended by EU, and listed in the previous chapter are not available at present. Most of them offer static information about the service to the citizen and businesses, or downloadable application forms.

Other significant projects regarding ICT in the public sector are: a computer for every student project; document management system for all the ministries; electronic land registry system, launched by Real Estate Cadastre Agency (May 2010), currently available for the city of Skopje and few other towns, and working on including entire

country; electronic grade-book, mandatory for all schools since 2012/2013; web publishing of school textbooks (April 2010); m-service which enables the payments of administrative fees by mobile phone (July 2011); m-parking; 680 Internet kiosks with additional wireless Internet in rural areas (January 2010); free of charge ICT courses; free of charge internet clubs; system for ranking of applicants for 'social apartments'; system for ranking of applicants for international cargo transport licenses (2007); budget planning system for budget users ([www.e-budget.gov.mk](http://www.e-budget.gov.mk)); e-democracy – integral system for parliament document and process management, etc.

Out of 9 measured horizontal enablers, only 2 are available in Macedonia: e-ID and e-Payment. The other 7 are either not yet in place or are used only within the individual projects.

According to World Economic Forum in 2012 [20], the Government Online Service Index that assesses the quality of government's delivery of online services on a 0-to-1 scale, Macedonia is ranked 69th out of 142 countries with index 0.32.

## 6 Discussion

Given the experiences regarding the role of ICT in the public sector in Estonia, Slovenia and Macedonia, we can make several conclusions about the role of ICT in the development growth paths of the three countries. As mentioned before, we focused solely on the comparison of selected ICT projects by the governments of the three countries, and not on the analysis of historical, political, social, and economic context of each country that requires more comprehensive approach.

Our insight shows that all the countries put the accent on services. Roughly said, ICT in the eyes of the users equals e-services of the government. However, the differences between the three countries are more than obvious. To put it more clearly, in Macedonia 10 basic e-services recommended by EU are not available, unlike in Slovenia or Estonia. In Estonia all horizontal enablers are functional, in Slovenia 6 out of 9 measured horizontal enablers are available, but only 2 in Macedonia.

Why is that so? Estonia has focused on ICT since its independence, and has been an early adopter with a consistent policy of promoting ICT use and investing in ICT infrastructure, as it has realized the potential benefits of ICT in enabling economic growth and development of the country. We have to mention again the proximity of technologically advanced Finland and Sweden, and population with high level of technical education, as a fertile ground for wide ICT adoption.

We can say that Slovenian leaders consider ICT as one of the growth tools, but not the main one. They lack the Estonian proactive behavior, they follow the EU recommendations, and that works well for Slovenia, because of its good starting position. The differences in ICT adoption in Estonia and Slovenia follow the differences in political reforms after gaining independence: Estonia directed radical changes in the sense of the liberalization of society, while Slovenia was oriented toward a so-called "gradualism" [2].

By contrast, Macedonia has been a late adopter of ICT (it lags at least 10 years behind Estonia). Notwithstanding the historical and geo-political differences between Macedonia and the other two countries, this has been, in our view, the main difference between Macedonia, Slovenia and Estonia respectively, as to ICT. Therefore, it is

very important to emphasize that ICT initiatives had not been undertaken by the Macedonian government until 2005. Starting 2006, a minister without portfolio in a newly formed Macedonian government was assigned to an information society development, and in 2010 a Ministry of Information Society was established.

Despite of the initiatives of the government, it appears that ICT has still not been recognized as a powerful growth tool, as it is in Estonia and Slovenia. Macedonian investment in ICT is significantly below Estonian and EU average (2,9% in Estonia, 2,7% in average in EU27, and 0,84% in Macedonia in 2009). Admittedly, individual, often successful ICT projects are undertaken, but there is a general lack of prerequisites: solid infrastructure, common registries, common data exchange layer, interoperability elements, most of the horizontal enablers, to number just a few. The ICT policies of the country are, though, of high quality. Laws regarding information society are also adopted to a large extent. On the level of written strategies and documents Macedonia is not behind the developed EU countries.

One of the first actions that the government with a vision of developed ICT should undertake is a proper prioritization of ICT projects for development; that is to say, the government should make more serious efforts to provide funds for the projects, technical expertise, governance structures, proper management of the projects, and regulation. The proactive behavior of the government will stay a set of wishes if the projects are not funded, if they are not backed by expertise and management.

## 7 Conclusion

ICT4D sets complex goals ahead, both as outcomes and as impact to a society. The effects for the economy appear where ICT users utilize the technology - create new knowledge, save time, create new jobs, new livelihoods, redesign business processes. Our research has analyzed the effects of ICT adoption and use in three countries with different approaches to ICT. Estonia was seen to be an early and intensive adopter of ICT, then Slovenia as first follower, whereas Macedonia lagged in the adoption of ICT and then did not adopt ICT as intensively.

Our results suggest that Estonia's approach was the most effective in creating economic growth; Slovenia has successfully developed its e-government services, but is behind Estonia. As to Macedonia's macroeconomic results that could be connected to development of ICT, we can say that they are still unsatisfactory.

These outcomes from ICT adoption as an impact to an economic growth were result of government's decisions in all three countries to invest in ICT. What makes the differences between them is the careful and elaborate selection of ICT projects and, which is, perhaps, most important, their successful execution.

We can pick out six crucial preconditions for development of ICT that will have tangible impact on economic growth: government is the leader in introducing information society; government is early adopter of ICT; government is proactive; government recognizes ICT as growth tool; government provides the funding; government provides quality project management.

The proactive government of Republic of Macedonia recognizes ICT as growth tool, but has funded poorly the ICT projects. In this respect, much more is needed to be done since Macedonia has to compensate the starting position of a late adopter.

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