THE CHALLENGES OF THE TRANSITION FROM E-GOVERNMENT TO DIGITAL GOVERNMENT

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ABSTRACT: *In the last two decades the web expansion from web of things to web of thought presents a real provocation for governments across societies to achieve citizens' expectations. The transition from e-government to digital government from reactive to proactive service delivery mechanisms is one of the governments main challenges worldwide. The aim of this paper is to analyse the readiness of governments across Europe for the transition from the traditional e-government to digital government. In the paper the digital government is analyzed comparatively with the e-government and focusing on the main differences.*

KEYWORDS: *digital government; e-government; advanced technologies; knowledge based economy; information society; comparative study; Europe; Romania*
JEL Code: *O00, O38, O57, C10*

1. INTRODUCTION

The e-government fields emerged in the late 1990's being focused on the transformation of traditional off-line government services available on-line[1].

In the last decades were published many research studies which analyse different aspects of the e-government (see: (Selhofer & Mayringer, 2001); (Zhiyuan, 2002); (Cuervo & Menéndez, 2005); (Andoh-Baidoo & Lawrencia, 2011); (Soukup, 2013). From neccessity, measurement methods were formulated and indicators were built up in order to have quantitative evidence to evaluate the level of the implementation and development, to compare the efficiency and performance (Vintar, Decman, Kunstelj, & Bercic, 2003). A study on the efficiency of e-government adoption and barriers to its implementaton in transition economies in the European context was published in 2016.

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[1] https://www.cio.com.au/article/590480/why-digital-government-about-moving-services-online/

(Szabo & Chiriac, 2016) A literature review on the current state and an investigation on the public value e-government was recently published. (Damascene & Andersson, 2019)

Globalization, digitalization are nowadays megatrends which asks for increased international competitiveness and needs qualified employees. In this respect the power , the engine of the development become the knowledge.

The great challenge worldwide is presented by the speed and the scope of the technological changes. We live in a dynamic, changing world, with emerging technologies and in order to assure wellbeing, prosperity for humanity the ethical aspects of the evolutions become important and get new dimensions. Governments must be more responsible, the policies must encourage the economic growth but protecting the planet, must ensure prosperity and end poverty, must keep the citizens safe and provide public servicies. Nowadays the transition toward digitalization is a hot topic. The aim of this paper is to analyse the readiness of governments across Europe for the transition from the traditional e-government to digital government.

Nowadays we assist the digital evolution which is happening very fast. From 1993, when become possible the usage of web 0.0 in just 20 years the humanity have to face the provocation of the web 4.0 environments. In a same time the digital revolution creates expanding availability of devices permitting increasing demand for digital services.

The transition is a long process which consist from the process of *digitization* - the transition from analog to digital - making information available and accessible in a digital format; the process of *digitalization* - the process by which is determined how to apply in a best way digitized information to simplify some specific operations; *digital transformation* - the process of integrating digitized data and digitialized applications into new applications. (Irniger, 2017)

The world is constantly changing and the digital transformation is one of the fundamental moving power of the development. It is widely accepted that digital platforms foster, spread and need innovation and the digitization imply economic growth and increased competitiveness.

The development is an expanding process. The digital transformation of the global information economy toward a resource based economy (toward a biobased economy) takes place at different speeds across societies.

In the 21st century the performance gains new meanings, the economic growth, the sustainable economic development, the social cohesion and equality of opportunity depends on the workforce skills, the abilities must meet the information age needs. The knowledge become an enabler of the development.

The paper studies the role of the government in the development; presents the digital government comparatively with the more traditional e-government; using publicly available data analyzes the readiness of governments across Europe for the transition. In section 2 the methodology and the used data is presented, the Section 3 interpret the obtained numerical results and the Section 4 contains the conclusions.

2.   METHODOLOGY AND DATA USED

We used publicly available databases such as Knowledge Assessment Methodology, which was created and published by World Bank with the aim to "help countries to

identify the challenges and opportunities they face in making the transition to the knowledge-based economy" (Chen & Dahlman, 2006). The information and communication technology opportunity index (ICT-OI) is published by ITU (Information Technology Union) is an important tool to track the digital divide by measuring the relative differences in ICT and is calculated using four sub-indices (network index, skills index, uptake index, intensity index) (ITU, https://www.itu.int/osg, 2007). Since 2009 to measure the Information Society, a database has been published by (ITU) using ICT development index (IDI) and ICT price basket (IPB), (ITU, Measuring the Information Society Report, 2018); the Global Competitiveness Index introduced by Xavier Sala-i-Martin in 2004, which enrols the economies in development stages, the countries rank is published annually by the World Economic Forum (Schwab, 2019), using different indicators grouped in 12 pillars. The 2018 edition introduce the new Global Competitiveness Index 4.0. The Innovation Union Scoreboard, which gives a comparative assessment of innovation performance of EU Member states based on the Summary innovation Index (SII), lists the countries in four performance groups (EC, European Innovation Scoreboard 2019, 2018); The Global Information Technology Report 2013 was a project within the framework of the World Economic Forum and INSEAD, (Baller, Dutta, & Lanvin, 2016) which publishes the Network Readiness Index (NRI) defined as a nation's or community's degree of preparation to participate in and benefit from information and communication technology developments; it is published since 2000-2001 and introduced by Kirkman et al in 2002 and redefined by Dutta et al in 2003, (Bilbao-Osorio, Dutta, & Lanvin). The e-Government Development Index (eGDI-UN), UN e-Government development database is published by the United Nations (UN, 2018). The e-readiness and Digital Economy rankings have been published since 2000 by the Economist Intelligence Unit (IBM – EIU (2009): E-readiness Rankings 2009, 2009). The Change Readiness Index measures countries abilities to manage change and cultivate opportunity through the social, governance and economic capabilities. (ODI, 2018). The Digital Agenda Scoreboard valuates the progress made in achieving the digital agenda for Europe's goals. (EC, Digital Agenda Scoreboard, 2018). The Global Innovation Index (GII) published by INSEAD and WIPO, measure the economy's innovation performance since 2007 (Dutta, Lanvin, & Wunsch-Vincent, 2018).

Regression analysis was used in order to verify the relationships suggested by the hypotheses. The quality of prediction is measured by the value R^2; in social science research any R^2 value above 0.5 is considered good. In order to measure the strenght of association between two ranked variables the Spearman's rank-order correlation, noted by ρ, was used. The correlation is very strong for values $0.9 < \rho < 1$, strong when $0.7 < \rho < 0.89$, moderate in the case of $0.5 < \rho < 0.69$ and moderate to low for $0.3 < \rho < 0.49$. When this value is included in the interval $0.16 < \rho < 0.29$ it means that the correlation is weak to low, and it is too low to be meaningful in the case of $\rho < 0.16$.

The selection of variables usually follows logic and rational paradigms. For data processing the SPSS software package was used.

3.   RESULTS AND ANALYSIS

Research studies analyse the role of digitalization in economic growth, highlight its impact on global competitiveness and analyses the economies readiness for the future of

production. We live in a rapidly changing world, the web expansion in the last two decades from web of things to web of thought presents a real provocation for economies worldwide.

The development needs innovativeness to offer competitiveness, needs technological infrastructure to create environement for the implementation of latest technologies and needs knowledge to be able for further development.

The development of technology directly affects the implementation of e-government which aim in 1990's was to transform the traditional off-line government in on-line, creating the availability of services on-line. But in a very short period the technology permitted the construction of smart government. Nowadays challenges for governments presents the implementation of e-government 4.0. Governments worldwide have to face the digital transformation, the transition toward digital government.

The digital government is not e-government. Glenn Archer Australian researcher considers that "digital government presents a journey having its first phase/station e-government". Till e-government aiming to improve existing processes the digital government means service transformation and innovation. Through digitalization the governments become more interconnected and assure the responsibility " to safeguard their citizens from a whole range of threats, enabling them to live and work without fear"[2].

What it means the readiness for transition, which countries are leaders, how can be identified the barriers and enablers of this process? If e-government is considered the first step in the digitalization process what we can say about its implementation in European context? For digitalization the successful implementation of e-government is a neccessity. Can be determined a connection between economic development and a successful implementation of e-government?

We formulated the following research questions, research themes:

Q1: Are key determinant factors of economic development the innovation performance, the level of knowledge, the implementation and usage of ICT? Is key-success factor of economic development the readiness to use the benefits of ICTs' ?

Q2: Has the mentality impact on the development?

Q3: Developed economies implemented successfully the e-government and in these economies the governments invests in advanced technologies and are ready for the future of production, are ready to achieve the SDGs'.

Next, using the publicly available data, presented in Section 2, we made a regression analysis in order to identify the relationship between the considered variables.

Question 1

Using the publicly available data the Spearman coefficients were calculated. The obtained values *(see Table 1)* are greater than 0.8 which show that a very strong relationship exists between the considered data and highlight that economic development measured in GDP is achieved if the countries are developed knowledge based economies (KEI) and information societies (IDI), if the countries have high innovative performance (SII). The readiness to use the benefits of ICTs' is key-success factor of economic development, countries with high NRI values create a favorable environment for

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[2] file:///C:/Users/user/Downloads/ey-digital-launch-content.pdf

transition, for digitalization as we can see in *Table 1*. Countries with high e-readiness value are the most developed ones and also invest more in advanced technologies.

Table 1

Spearman rank correlation ρ^*	GDP/capita
eGDI-UN	0.739
KEI	0.848
IDI	0.849
NRI	0.782
e-readiness	0.922
KI	0.861
SII	0.927
Innovation (WB)	0.911
ICT (WB)	0.821
ICT-OI (ITU)	0.897

Table 2

ρ^*	Change Readiness Index (CRI)	
eGDI-UN		0.815
	Telecommunication infrastructure	0.921
IDI		0.940
	Use sub-index	0.924
NRI		0.957
	Environment sub-index	0.944
	Usage sub-index	0.959
	Impact sub-index	0.938
GII		0.951
SDGI		0.944
KEI		0.903

*Correlation is significant at the 0.01 level

Own calculations based on data

Question 2

The ability to manage change and build up a climate-ready future can be considered key-success factor of development and of the transition as we can see in Table 2. The Change readiness index (CRI) is calculated taking in consideration the enterprise, government, people and civil society capability.

Our results show a very strong relationship between the considered variables, the calculated Spearman coefficients, noted by ρ^* are higher than 0,9 (see Tabel 2). Thus, the most developed konowledge-based economies (KEI) and information societies (IDI) are the most innovative economies (SII) and the leaders in the achievement of sustainable development goals (SDGI) and also these economies are ranked on the first positions regarding the ability to manage change.

In these economies, in developed economies, exists a favorable environement for the implementation of e-government (see Table 3) and these countries are ready for transition toward digital economy. (See Figure 1)

Tabel 3

	eGDI-UN	
IDI		0.865
NRI		0.848
	NRI usage	0.855
	NRI impact	0.854
	NRI environment	0.788
	NRI readiness	0.734
GII		0.820
	GII ICTs	0.876
SDGI		0.805
KEI		0.832

Figure 1
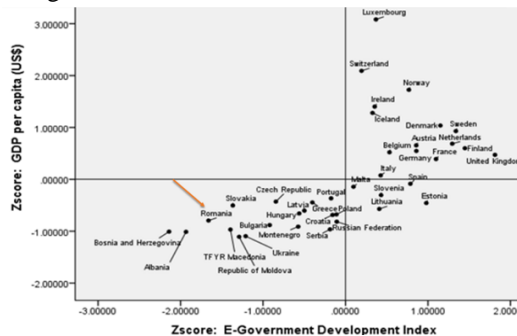
Own calculations based on data

Question 3

We analysed the level of governments' procurement of advanced technology products. World Economic Forum (WEF) is consider that the government procurement of advanced technologies is an enabler and help country to generate innovation.

„A lot of governments, regardless of technology, are not able to fulfill the mission the way the citizens expect. " (Dante Ricci – Global Public Services team) (Kunkle, 2018)

We analysed the key success factors of the government procurement of advanced technologies across European economies. We are interested in which economies the level of the procurement is high. In this respect we used NRI data. The NRI composit indicator is built up on 10 pillars and the second pillar (Business and innovation environement) contains the „government procurement of advanced technology product" indicator (Romania is ranked on 104 position from 139 analysed economies).

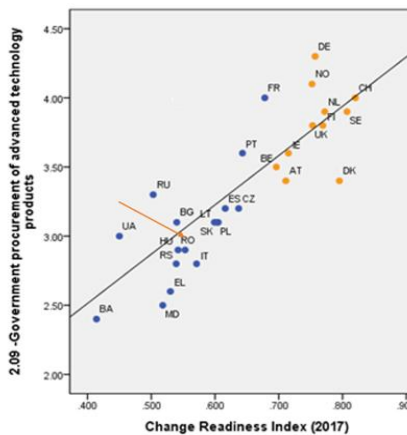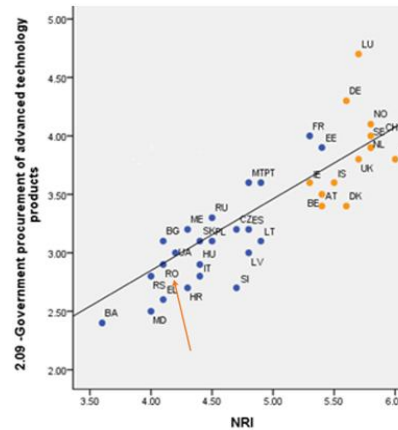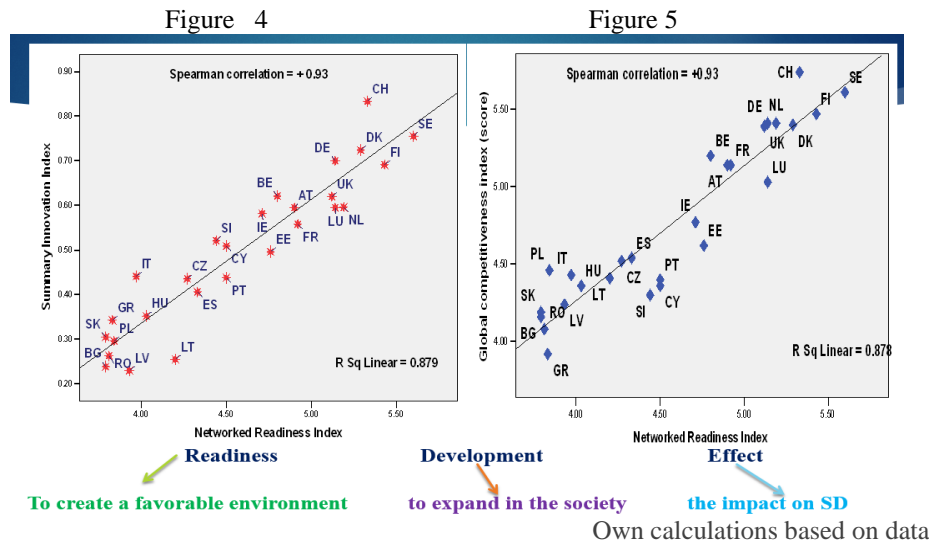Figure 2   Figure 3

Own calculations based on data

The obtained results, as we can see on Figures 2 and 3, highlight that the governments of developed economies, with high GDP (yellow points), invest more in the procurement of advanced technology product. These countries are able to manage the change and have also high NRI values. Thus in these economies favorable political, business environement was created which facilitate the development.

Countries with high NRI score are the most innovative (Figure 4) and most competitive ones (Figure 5) as well.

Figure   4   Figure 5

Readiness   Development   Effect

To create a favorable environment   to expand in the society   the impact on SD

Own calculations based on data

The evolution, the changes of the internet is a fast and continuous process which created the possibility in the last 2010's the usage of the semantic web (web3.0) and later of the active web (web 4.0). This fact presents a high jump taking in consideration that in 80's (web1.0) the internet users were limited to use a static content, weren't able to upload any new content. The web2.0 permitted that the internet become global phenomenon.

The evolution of e-government is determined by the fast changes of internet, by the development of technology and the levels of the evolution are called egov0.0 early work, egov1.0 in the early 1980's when files begin to be electronic, egov2.0 when direct interaction with the public was permitted, in the late 2010's the web suported the construction of smart government egov3.0. The egov4.0 means activity 3D-virtual fully integrated in a real world.

Yannis Charalabidis from University of Aegean presented at Samos Summit in 2015 the paradigm shift for gov3.0. Gov1.0 means e-government aiming to offer better services through a connected governance; gov2.0 is a platform government aiming to offer openness and collaboration through open and collaborative governance and gov3.0 means smart government. (Charalabidis, 2010)

OECD (The Organisation for Economic Co-operation and Development) defines the digital government as „the use of digital technologies, as an integrated part of governments' modernisation strategies, to create public value" and that it „relies on a digital government ecosystem comprised of government actors, non-governmental organisations, businessees, citizens' associations and individuals which supports the production of and access to data, services and content through interactions with the government." The e-government is defined as:"the use by the governments of

information and communication technologies (ICTs), and particularly the internet, as tool to achieve better government[3].”

4. CONCLUSIONS

The digitalization, the transition from e-government to a platform and smart government is a new challenge worldwide which permits to governments to become more interconnected, having the responsibility of offering safety for the citizens and permitting to them to live and work without fear[4].

A succesful transition is a very complex issue, needs targeted strategies, appropiate policies.

Digital transformation is successful in innovation-driven economies which are developed knowledge-based economies which permits the development of the information society creating favorable environement for digital economy.

Because e-government presents the first step in digital transfomation we analysed its level of implementation across economies. The obtained results show that the level of adoption of e-government is determined by the level of development of knowledged based economy (KEI), the level of implementation of information society (IDI), the innovative capacity of the economies (GII) and strongly depends on the nation's or community's degree of preparation to participate in and benefit from information and communication technology developments (NRI).

The developed economies governments invests more in advanced technologies, these countries are leaders regarding the implementation of e-government, the transition to digital government is a fast process. The transition toward digital government suppose at first the successful adoption of e-government.

Between the level of adoption of e-government and the achievement of sustainable development goals a strong relationship was identified. The calculated Spearman rank coefficient was 0,805. A succesful implementation of e-government increases the e-participation, the calculated $\rho = 0,853$, thus a linear relationship can be identified.

The obtained results highlight that the number of individuals interacting online with public authorities is determined by the level of development of information society, the level of readiness, the level of development of KEI, the ICT-OI, the level of implementation of e-government.

Romania lag behind EU member states on different indicators as we can see on the Figures 1-5. Innovativeness, education, qualified employee, competitiveness, adoption of new technology by government all present challenges and need policy change. (Chiriac & Moldovan, 2009), (Moldovan, 2018).

The new latest technologies could help government become better connected to their citizens and to become more efficient. The obtained results explain why Romania was ranked by DESI (The Digital Economy and Society Index 2018) on the last palces in EU. Longitudinal data highlight that the digital transformation of public services presents a

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[3] http://www.atlas101.ca/pm/concepts/digital-government-and-e-government/
[4] https://www.ey.com/en_us/government-public-sector/how-does-digital-government-become-better-government

very slow improvement, the calculated score for Romania increasing slowly but in ranking the position worsen (in 2016 was ranked on 26 position, in 2017 on 27 and 2019 on 28).

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