Conceptualization of an Integrated Indicator Model for the Evaluation of e-Government Policies

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Abstract: Following the initial success of the information and communication technology-enabled changes in the public sector, the concept of e-government was expected to provide a leap forward, facilitating the comprehensive reform of public administration operations and redefinition of service delivery to citizens. Despite the significant advancement in the last decade or so, the contribution of e-government in achieving the increased acceptance of online government services, cost reduction and greater effectiveness of public administration has remained rather ambiguous and undetermined. All these facts suggest that current planning, development and implementation of e-government policies is unsatisfactory, whereas lacking reliable indicator models consequently results in arbitrary evaluation and uninformed decision-making in the e-government field. Paper presents an analysis of existing indicator models for evaluation of e-government policies, identifies characteristic evaluation aspects and evaluation levels, and conceptualizes an integrated indicator model for evaluation of e-government policies. Analysis offers an insight into the current evaluation practice, enables detection of its deficiencies and provides a valuable contribution to the development of applicable indicator models facilitating more evidence-based evaluation of e-government policies. .

Keywords: E-government policies, evaluation, evaluation aspects, evaluation levels, integrated indicator model

1 Introduction

Despite extensive research in the recent years (WEF, 2011; ITU, 2012; Pardo et al, 2012; Cordella and Bonina, 2012; Calista and Melitski, 2013; Khan and Park, 2013, etc.) and considerable investments in the field; EU countries are investing approximately 2.2% of GDP in public sector ICT (Capgemini, 2009, 2010 and 2011), the phenomenon of e-government remains ambiguous and still lacks a unified definition. OECD studies indicate that further e-government development is one of the most important factors of public sector rationalization, as well as faster countries' development (OECD, 2009a, 2009b and 2010). Considering the e-government development so far, we have been witnessing a big gap between the supply and demand of public e-services in most countries, which can be prevailingly attributed to the "politically driven" development rather than "evidence based" evaluation and selection of e-government policies (Kunstelj et al, 2007; Kim, 2007; Vintar and Nograšek, 2010; Rana et al, 2013). Earlier research has shown that some countries (e.g. Estonia) (Dutta, 2007; UN, 2008, 2010 and 2012; WEF, 2011) have been accomplishing much better results in the evaluation and implementation of e-government policies compared to several other countries with much higher investments (Calista and Melitski, 2013). Past experience in the field and public finance trends evidently require the development of indicator models (the collective term "indicator models" will be used hereinafter, denoting different approaches, methodologies, measurement and assessment frameworks and similar undertakings for the evaluation of e-government policies) for the evaluation of e-government policies which could enable e-government decision-makers to conduct more qualified and quantified preparation, execution and evaluation of e-government policies – be it before or after their implementation (ex-ante or ex-post).

Despite the increasing number of indicator models, their diversity and lack of unified and clear theoretical foundations (OECD, 2001; Vintar and Nograšek, 2010; Bannister, 2007; Janssen et al, 2004; Kromidha, 2012; Seng, 2013), prevent a comparison of their evaluation results. The differences between them arise from various reasons: different (EU, UN, Brown University, Economist Intelligence Unit etc.) and heterogeneous promoters (international, national, consulting, research institutions etc.) (Vintar and Nograšek, 2010), diverse environments (AGIMO, 2004; eGEP, 2006), various rationales (Seng, 2013) and contextual background as well as the number (e.g. AGIMO contains approx. 150 indicators and eGEP contains 92 indicators) and selection of indicators (AGIMO, 2004; eGEP, 2006). Significant differences between indicator models are reflected within their main evaluation aspects and evaluation levels. Namely the indicator models vary widely depending on the different evaluation aspects (economic and sustainability, political-sociological, infrastructural and

organizational) and evaluation levels within e-government policies, they are predominantly focused on (territorial-administrative unit, sector policy, program, organization, project).

Thus, the main goal of the paper is to examine the state of affairs in the field and analyse the existing indicator models for the evaluation of e-government policies, conduct identification and characterization of the key evaluation aspects and evaluation levels within e-government policies and present a conceptualization of an integrated indicator model for the evaluation of e-government policies. Deriving from the aforementioned research objectives and referring to our own study, and findings of other authors, the paper is focusing primarily on the following interrelated research questions:
Overview and analysis of the existing indicator models for the evaluation of e-government policies.

- Identification and characterization of the key evaluation aspects and evaluation levels within e-government policies.
- Conceptualization of an integrated indicator model for the evaluation of e-government policies.

From the methodological point of view, the research represents a typical in-depth analysis based on the study of related literature and comprehensive review of the existing indicator models for the evaluation of e-government policies. Combining different techniques of qualitative research methods, the initial part of the study has focused on the analysis of primary and secondary sources, whereas deriving from the obtained research results, the conclusive part of the research is striving to integrate theoretical and practical aspects regarding the research subject and provide a conceptual, but still an applicable solution in a form of an integrated indicator model. The research was conducted within the research project aiming to establish the groundwork for the development of an integrated indicator model for the evaluation of e-government policies in Slovenia.

Following the introduction, the second section of the paper presents an overview of the relevant literature while outlining various directions in the evaluation of e-government policies and provides an analysis of the existing indicator models as well as related issues and barriers. The third section comprises the categorization of the key evaluation aspects and evaluation levels within e-government policies, while the fourth section outlines the conceptualization of an integrated indicator model for the evaluation of e-government policies. The last section contains the review of the overall research, discussion on its limitations and subsequently submits the final arguments and observations regarding the research results and future work.

2 Indicator models for evaluation of e-government policies – state of the art

In parallel to e-government development there have emerged numerous indicator models trying to evaluate its development and effects on different parameters of government operation. According to the subject of evaluation, these indicator models could be classified in typical groups presented below.

2.1 Front-office maturity and readiness

Benchmarking of e-government development has become a very popular subject of comparison among countries over the last decade, resulting in the progress of the whole range of benchmarks (Kromidha, 2012). On the EU level the most known benchmark measurements have been conducted by Capgemini (Capgemini, 2009, 2010 and 2011), while the most renowned benchmark measurements on the global scale have been carried out by the UN (UN, 2008, 2010 and 2012), Accenture (Accenture, 2009) and Brown University (West, 2008). All those indicator models used completely different indicators (from measuring 20 specific e-government services to web-based analysis of national portals, particular ministry portal etc.). They are all primarily focused on the web site analysis (front-office). The indicators from those indicator models are not precise enough to ensure comprehensive evaluation and validation of e-government policies on the national level (see critical analysis of such benchmark measurements from Vintar and Nograšek, 2010; Bannister, 2007; Dadayan, 2006; Kromidha, 2012 etc.). On the other hand, some important benchmark measurements dealing with e-readiness or so-called e-government readiness which could form the basis for planning of the necessary infrastructure for e-government development are: The Global Information Technology Report (WEF, 2010), Digital economy rankings (Economist Intelligence Unit, 2010), Measuring the Information Society (ITU, 2012) and United Nations e-Government Survey (UN, 2008, 2010 and 2012). These benchmark measurements deploy different sets of indicators for benchmarking e-readiness and information society in general (e.g. Network Readiness Index from The Global Information Technology Report consists of three sub-indexes, while Digital economy rankings measure e-readiness on the basis of more than 100 qualitative and quantitative

indicators). These indicator models are rather extensive, hardly providing applicable guidelines, which countries could rely on in the process of further e-government readiness improvement and accomplishing better e-government effectiveness.

2.2 Effects and impacts of e-government policies

Ex-ante and ex-post evaluations of e-government policies are subject of numerous indicator models, among which we could highlight: MAREVA (ADAE, 2007), eGEP (eGEP, 2006), WiBe 4.0 (Rothig, 2010) and Australian AGIMO (AGIMO, 2004). MAREVA and accompanying tools are dealing with the ex-ante and ex-post evaluations of e-government policies on the basis of parameters, such as profitability, risks, benefits to external users, benefits to civil servants, services and project necessity; similar aspects are evaluated by WiBe 4.0. The main purpose of eGEP is to identify and analyse costs of establishment, provision and maintenance of e-government services, as well as to provide an economic analysis and evaluation of their performance and impacts. AGIMO additionally developed Demand and Value Assessment procedures. In general, we could find these indicator models very exhaustive in terms of the large number of indicators; however they rarely address the concept of public benefits comprehensively, while the vast amount of data needed for the applied indicators considerably complicates their transfer to other environments.

Planning and implementation of e-government policies require careful scrutiny of sourcing alternatives (Stanimirovic and Vintar, 2012). If e-government, as some scholars believe, tends to progress towards vertical and horizontal integration at least within a given level and branch of government, sourcing decisions may require more frequent review and revision (Scholl, 2006; Cordella and Willcocks, 2012). Sourcing issue is thoroughly discussed and analysed by Greaver (1999), who identifies the key activities and structure of multi-dimensional process of evaluation and implementation of outsourcing. Kern et al (2002) further analyse specific aspects of external implementation of ICT projects and address indicators for more objective evaluation in the process of decision-making for outsourcing of ICT projects. Lacity and Willcocks (2009) proposed a comprehensive and extensive survey considering outsourcing of ICT projects. Surveys in this area are mostly dealing with sourcing issues in private sector firms, clearly they are predominantly focused on costs and other financial aspects, while organizational and human resources aspects are addressed to a smaller extent. Consequently, results of these surveys are hard to utilize in public sector organizations.

Implementation of e-government policies significantly affects public sector organizations in terms of changes in organizational structure, business processes and organizational culture at organizational and inter-organizational level (Almahamid, 2013). The previous studies are focusing on one or more organizational dimensions. Klievink and Janssen (2009) analyse joined-up e-government model, Fleur van Veenstra et al (2010) explore organizational changes in the direction of network government, Schedler and Schmidt (2004) analyse management, organizational culture and external factors which affect e-government development, Scholl (2003 and 2006) studies business process change, information management capacity and organizational capabilities, while Leitner and Kreuzeder (2005) highlight organizational culture aspect as well. Overview of the related studies reveals there is no clear consensus on organizational changes caused by the e-government implementation, and consequently no comprehensible method to measure these changes.

2.3 National-level development

External factors have very significant impact on the e-government development; surveys often highlight political and sociological factors as the most important external factors (Lakka et al, 2013; Roman and Miller, 2013; Cordella and Bonina, 2012). This aspect is partially discussed in the United Nations e-Government Survey (UN, 2008, 2010 and 2012) through indicators such as e-participation, e-inclusion, e-consultations, e-decision-making. Study of Martin and Byrne (2003) focused on the critical factors of information society development and analysed its components. Their survey provides a set of political and sociological indicators for the evaluation of e-government such as accessibility, digital divide, north-south divide, human rights, social welfare, social inclusion, economic sustainability and life-long learning. However, we can see that such indicators are very general and it is hard to incorporate them in a national context and determine their actual impact and correlation with e-government development. Activities on the national economic level could significantly affect e-government development in the individual country, so national economic factors must not be neglected (ITU, 2012). Bavec and Vintar (2007) developed a model in their study which aimed to identify relationships between the national economic indicators and e-government indicators on the national level and on the EU level. The national economic indicators surveyed in the presented study comprised: GDP

per capita, competitiveness, economic performance, government efficiency, use of ICT in the private sector, innovation index and internet access. The study above is one of the few trying to define correlation between the national economic indicators and e-government development indicators. Research work in this field is rather scarce (Lakka et al, 2013); Kim (2007) and Singh et al (2007) are partially dealing with the national indicators within their research work.

2.4 Analysis of existing indicator models for evaluation of e-government policies

The review of the existing indicator models was conducted in the first half of 2012. During that time the research team scanned journals and conference proceedings, books, reports of international organizations and other institutions, policy papers, development strategies and other related documents containing e-government related research. Focusing particularly on the measurement, assessment and evaluation of e-government policies and their effects, we identified more than 50 relevant references. The frequency of references is becoming much higher in the second half of the last decade, proving the field is evolving rapidly and attracting more interest. Given the objectives of our research in which we have endeavoured to establish an applicable indicator model for the evaluation of e-government policies, our analysis predominantly focused on the application level of the existing indicator models and identified basically three types of references: 1) purely theoretical papers aiming to develop some kind of conceptual framework for the evaluation of e-government policies, 2) research efforts developed up to the degree of pilot application and 3) indicator models developed in the practice for the practice (practical application). The identified indicator models and their classification according to the application level are shown in Table 1.

Table 1: Identified indicator models and their classification according to the application level.

Ser. Num.	Author(s) – Year	Application level
1.	ADAE. Electronic Administration Development Agency (2007)	Practical application
2.	Rothig, P. (2010)	
3.	AGIMO. Australian Government Information Office (2004)	
4.	OECD. Directorate for science, technology and industry (2005)	
5.	Baudu, S. and Dzhumalieva, S. (2010)	
6.	RSO SpA & LUISS Management (2006)	
7.	WEF. World Economic Forum (2010/2011)	
8.	UN. United Nations (2008/2010/2012)	
9.	Rama Rao, T.P., Venkata Rao, V., Bhatnagar, S.C. and Satyanarayana, S.J. (2004)	
10.	Holzer, M. and Kim, S.T. (2007)	
11.	Economist Intelligence Unit (2010)	
12.	West, D. (2008)	
13.	European Commission, Capgemini, & IDC (2011)	
14.	Capgemini, IDC, Rand Europe, Sogeti and DTi (2011)	Pilot application
15.	Accenture (2009)	
16.	Deloitte & Ipsos Belgium (2011)	
17.	UNESCO (2005)	
18.	Mahalik, D. (2010)	
19.	Capgemini (2007)	
20.	Empirica (2009)	
21.	Weehuizen, R. and van Oranje, C. (2007)	
22.	Jensen, P.H. (2007)	Conceptual framework
23.	Lacity, M. and Willcocks, L. (2009)	
24.	Greaver, M.F. (1999)	
25.	Kern, T., Willcocks, L.P. and van Heck, E. (2002)	
26.	Devadoss, P.R., Pan, S.L. and Huang, J.C. (2002)	
27.	Ho, A.T.K. (2002)	
28.	Moon, M.J. (2002)	
29.	Chen, Y.C. and Perry, J. (2003)	
30.	O'Donnell, O., Boyle, R. and Timonen, V. (2003)	
31.	Griffin, D., Foster, A. and Halpin, E. (2004)	
32.	Schedler, K. and Schmidt, B. (2004)	
33.	Leitner, C. and Kreuzeder, M. (2005)	
34.	Scholl, H.J. (2006)	

35.	Elnaghi, M., Alshawi, S. and Missi, F. (2007)	
36.	Indihar Štemberger, M. and Jaklič, J. (2007)	
37.	Klievink, B. and Janssen, M. (2009)	
38.	Pollitt, C. (2010)	
39.	CIO Council (2002)	
40.	Republic of Korea, Ministry of Public Administration and Security (2010)	
41.	OECD. Working Group 2 on E-government and Administrative Simplification (2007)	
42.	Martin, B. and Byrne, J. (2003)	
43.	van Veenstra, A.F., Janssen, M. and Tan, Y.H. (2010)	
44.	Boyer-Wright, K.M. and Kottemann, J.E. (2009)	
45.	Picci, L. (2006)	
46.	Singh, H., Das, A. and Joseph, D. (2007)	
47.	Rhee, D.Y. (2009)	
48.	Schwester, R.W. (2010)	
49.	Serrano-Cinca, C., Rueda-Tomás, M. and Portillo-Tarragona, P. (2009)	
50.	Bavec, C. and Vintar, M. (2007)	
51.	Gallego-Álvarez, I., Rodríguez-Domínguez, L. and García-Sánchez, I.M. (2010)	

Analysing the diverse variety of the indicator models identified in this area, certain general characteristics were identified and summarised below:

- The majority of identified indicator models are providing only a conceptual framework for the evaluation of e-government policies, while only a small number of indicator models have achieved practical application.
- The identified indicator models for the evaluation of e-government policies are mostly presented in scholarly papers and books.
- A small number of indicator models is appearing in the form of specific handbooks, some of which include a tool for evaluation of e-government policies, for example WiBe 4.0 or VAST (software packages, Excel spreadsheets etc.).
- Certain indicator models are rather abstract containing speculatively selected indicators often encompassing non evidence-based theoretical platforms, while their utilization does not facilitate the acquirement of quantifiable evaluation results.
- Indicator models are to a large extent narrowly focused assessing predominantly one or two features of e-government policies.
- Mature indicator models are consisted of a large number of indicators normally aligned for the evaluation of e-government policies in the originating countries.
- Indicator models generally do not provide a comprehensive evaluation of complex e-government policies impacts and their potential long-term public benefits.
- Various groups of indicators are appearing in dozens of different indicator models, including a large number of overlapping. Definitions of indicators vary widely, and while evaluations are based on the completely different methodological platforms, their results are very difficult to compare.

The majority of the above-mentioned indicator models are undoubtedly applicable to the certain extent and can improve the quality of decision-making processes in the e-government field, however, according to revealed limitations and deficiencies, they fail to facilitate the evaluation of e-government policies in an all-encompassing manner. Moreover, in addition to their narrow focus and certain methodological inconsistencies, they are largely based on relatively simple software platforms, which on the one hand simplify their use and increase transparency, while on the other hand, they considerably limit a wide range of functionality such as simulation, visualization and sensitivity analysis, which could significantly assist decision-makers in adopting more sound decision. The most prominent indicator models, such as MAREVA (ADAE, 2007), WiBe 4.0 (Rothig, 2010) and AGIMO (AGIMO, 2004), which have been most extensively used in everyday evaluation practice, are based on national characteristics of the administrative system and include material, procedural, legislative and other specifics of the public sector from which they originate. They are extremely detailed and extensive, containing a large number of indicators, which are specifically tailored for the evaluation of adequately documented e-government policies from the well-structured and organized administrative environment. These and similar particularities substantially restrain their transfer and

application in environments such as Slovenia, where the evaluation efforts are still in the early stage, and similar projects are rather poorly documented, preventing the collection of necessary data for the detailed list of indicators, as required by the aforementioned indicator models. Although certain of the outlined indicator models have achieved a high level of maturity, some crucial aspects of the public policy evaluation, such as the public interest, are unreasonably understated and marginalized.

2.5 Evaluation of e-government policies – issues and barriers

The evaluation of e-government policies is generally difficult (Capgemini, 2010; OECD, 2010; Bannister, 2007; Dadayan, 2006; Andreasson et al, 2012) given the frequent lack of clarity of objectives owing to the different and often competing views held by different stakeholders. Overlapping of e-government initiatives and their continuous fine-tuning further complicate monitoring and evaluation. The fact that e-government is relatively new is probably the main reason for fewer models and actual outcome experiences that can be used for benchmarking (OECD, 2007). In addition, ICT projects are hard to evaluate because of the pervasive nature of ICTs, the integration of ICT goals with policy goals and the organizational changes that necessarily accompany e-government initiatives. The effective evaluation requires good metrics, regular monitoring and reporting, disciplined and professional use of robust evaluation frameworks and the use of long-term evaluation practices. These qualities depend on a government's overall evaluation culture (OECD, 2007). E-government project failures could have been prevented or at least mitigated by appropriate evaluation in the course of their conceptualization and planning (Vintar and Nograšek, 2010; Janssen et al, 2004; BAH, 2002; Seng, 2013). The identification and elimination of the main obstacles to e-government evaluation, which obviously extend to several areas, such as: institutional, political, social, and cultural area, require a broad consensus and a strong commitment of all stakeholders.

3 Key evaluation aspects and evaluation levels within e-government policies

Although relatively extensive (Khan and Park, 2013), previous research in the field is substantially limited and rather unilateral. The existing indicator models are partial and mostly focused on evaluating changes that occur in the "front-office" operation, in the process of government transactions with external users, particularly business entities and citizens (Rana et al, 2013), while studying organizational changes within government operations (back-office) caused by e-government, ICT and other technological innovations, has largely failed to gain significant attention. Accordingly, there are only a few indicator models, which could be actually applied for the evaluation of e-government policies and decision-making at higher levels. In addition, the existing indicator models for the evaluation of e-government policies are encompassing predominantly one aspect of the evaluation or focusing only on the evaluation of particular level within e-government policy. Up to date studies as well as available basic and applied research of e-government area facilitate extraction and synthesis of the key evaluation aspects and evaluation levels covered by the existing indicator models.

3.1 Evaluation aspects

Analysis of the existing indicator models enabled identification of several different evaluation aspects. Although they tend to be partial and insufficiently defined, the evaluation aspects can be distinguished and roughly divided into four categories. Below are described accredited evaluation aspects and the research characteristics concerning each particular aspect:

- *Evaluation of transformational effects*: changes in back-office, the reduction of hierarchical levels, business process reengineering, outsourcing, reduction of administrative barriers, costs and burdens etc. (organizational aspect);
- *Evaluation of infrastructure investments*: costs of ICT infrastructure, data infrastructure, human resources, legal framework (infrastructural aspect);
- *Evaluation of political and sociological effects*: transparency, openness, corruption, user satisfaction, democratization, participation (political-sociological aspect);
- *Evaluation of economic and sustainability impacts*: costs, public benefits, effects on GDP, competitiveness index, economic growth, sustainable development (economic and sustainability aspect).

3.1.1 Organizational aspect

Previous research dealing with e-government induced changes within organizational and inter-organizational aspect is primarily focused on: changes in the organizational structure, business process reengineering and changes in organizational culture and human resources (Halachmi and Greiling, 2013). Studies dealing with changes in the organizational structure are focusing on the reduction of hierarchical levels, decentralization of activities, standardization of procedures, coordination, control and transformation of the existing relations inside and outside the organization (Klievink and Janssen, 2009; O'Donnell et al, 2003; Griffin et al, 2004; Almahamid, 2013). Research dealing with the business process reengineering is analysing the horizontal implementation of processes (integration of functions and services), vertical implementation of processes (integration of organizations), speed of information exchange, changes in process definition rules and changes in time and place of operation (Scholl, 2003; Layne and Lee, 2001; Elnaghi et al, 2007). The research exploring the change in organizational culture is primarily dealing with: changes in the philosophy of employees and leaders, strengthening the sense of affiliation to the organization and enhancing confidence in organizations (Schedler and Schmidt, 2004; Ho, 2002). Changes in the human resources refer to the new skills and knowledge that employees need to comprehend, due to the e-government implementation and new managerial capabilities combining ICT knowledge and process dimensions of the organization (Leitner and Kreuzeder, 2005). However, most of the studies address all of these organizational dimensions at least indirectly, suggesting that the analysis and evaluation of organizational changes when introducing e-government should be multi-dimensional and requires a strategic approach.

3.1.2 Infrastructural aspect

Evaluation of the infrastructural aspect covers primarily the maturity or environmental readiness for e-government and e-commerce. Research in this area is focused either on the internal or external aspect of e-government. Internal aspect research is primarily engaged in (Kunstelj and Dečman, 2004; Kunstelj and Vintar, 2004; Pardo et al, 2012): strategies, policies and action plans for development of e-government, legal frameworks for e-business, policies for ICT usage, existence and use of appropriate information infrastructure, training of human resources for e-government, knowledge management about the benefits and pitfalls of e-business (Hellang et al, 2013), financial issues, motives and obstacles for the development of e-government. Research on the external aspect of the environment maturity is particularly concerned with (Kunstelj and Dečman, 2004; Kunstelj and Vintar, 2004; ITU, 2012): ownership, user interest and degree of ICT infrastructure usage (including the digital divide), the obstacles and reasons for lack of e-government services usage and opinions related to the development of e-government in general. The most studies of environment maturity do not treat internal and external aspects separately.

3.1.3 Political-sociological aspect

Proliferation of advanced ICT solutions and the development of e-government have changed the social structure and political-sociological paradigm of the country as the widest social community (UN, 2010; Norris, 2001; Hellang et al, 2013; Cordella and Bonina, 2012). Political-sociological effects of the ICT and e-government on the society in general are very complex. They have a significant impact on changes of the social environment; they are affecting old and creating new forms of work and changing perception of the world and social relations (Slevin, 2000; Anttiroiko, 2001; Thurlow et al, 2004; Shim and Eom, 2008; Aladwani, 2013). Accordingly, the existing indicator models are converging on the following aspects of e-government evaluation: accessibility (OECD, 2009a; UN, 2008, 2010 and 2012; Ho, 2002), citizens' trust and confidence (Accenture, 2009; Tolbert and Mossberger, 2006; Parent et al, 2005; Cegarra-Navarro et al, 2012), digital divide (Norris, 2001; OECD, 2007 and 2009a; WEF, 2010), social stratification and cohesion, citizens' rights and democratic participation (OECD, 2009b; WEF, 2011; Martin and Byrne, 2003; Roman and Miller, 2013), openness, transparency and corruption (UN, 2008, 2010 and 2012; Capgemini, 2011; Halachmi and Greiling, 2013). Notwithstanding that reliable and adequate evaluation of the wide-ranging e-government impacts could provide the key information to policy makers needed for steering the development of e-government and e-services to the right direction (Capgemini, 2011; OECD, 2010), the indicator models covering comprehensively political-sociological aspects of e-government policies are rather scarce.

3.1.4 Economic and sustainability aspect

Research on the economic and sustainability aspect is focusing on the implementation of e-government policies on the national level and the evaluation of their impacts on the national economic indicators and

sustainable development and vice versa (Haque and Pathrannarakul, 2013). Namely, economic activities on the national level are significantly affecting the level of e-government development in each country (Seng, 2013; Lakka et al, 2013). Up to date research considers the basic and most important economic indicator on the national level, affecting the development of e-government, to be GDP per capita (Bavec and Vintar, 2007; Singh et al, 2007). Sing et al (2007) assume that GDP plays a crucial role in the development of e-government via three influential factors (technological infrastructure, human capital and management index). Other prospective indicators at national economic level are: competitiveness, economic performance, government efficiency (Halachmi and Greiling, 2013), use of ICT in the private sector, innovation index (Bavec and Vintar, 2007), education and urbanization (Kim, 2007). National level indicators are obviously overlapping with the political-sociological level indicators through political institutions, legal environment, tradition of governance, political culture, socio-cultural environment and civil liberties (Bolgherini, 2007; Lor and Britz, 2007).

3.2 Evaluation levels

Next to the categorization of the indicator models rendering four different evaluation aspects, indicator models can be classified according to the evaluation levels as well. During the research of the existing indicator models, five evaluation levels have been extracted and outlined: territorial-administrative unit level, sector policy level, program level, organization level and project level. Each of the specified evaluation levels can be evaluated using indicators from the different evaluation aspects presented above; also, some indicators contained within evaluation aspects may be used for the evaluation of one or more designated levels:

- *Territorial-administrative unit level* of the evaluation refers to the territorial / administrative level being observed (e.g. particular level within the country; region, federal state, particular level between countries; cross-border regions and series of countries or country members of transnational organizations such as EU, OECD and UN).
- *Sector policy level* of the evaluation encompasses various policies which are the subject of the evaluation (e.g. tax policy, environmental policy, research policy etc.).
- *Program level* of the evaluation focuses on programs which usually present groups of program-related projects (e.g. e-health and e-learning program).
- *Organization level* refers to the different levels of organizations (e.g. the level of state agency, ministry or its organizational unit/s, the level of municipality or any other public administration body).
- *Project level* of the evaluation covers indicator models focused on projects, and services resulting from the projects (e.g. informatization of the process/service for establishment of a business).

Numerous difficulties were encountered trying to delineate the above itemized evaluation levels covered by particular indicator model, since the contained indicators are not clearly defined, enabling their speculative use on different evaluation levels. Comprehensive evaluation of e-government policies requires taking into account the complex structure of e-government and the intricacy of policy process itself. Proposed conceptual model for the evaluation of e-government policies attempts to capture a wide range of relevant factors, which is reflected in broadly defined aspects of evaluation (economic and sustainability, political-sociological, infrastructural and organizational), while it should also allow the evaluation of e-government policies at different levels (territorial-administrative unit, sector policy, program, organization, project). The conceptual model should lay the theoretical and practical foundations for later development of an integrated indicator model including the relevant and well defined indicators in depicted categories (evaluation aspects and levels). The conceptual model for the evaluation of e-government policies is presented in Figure 1.

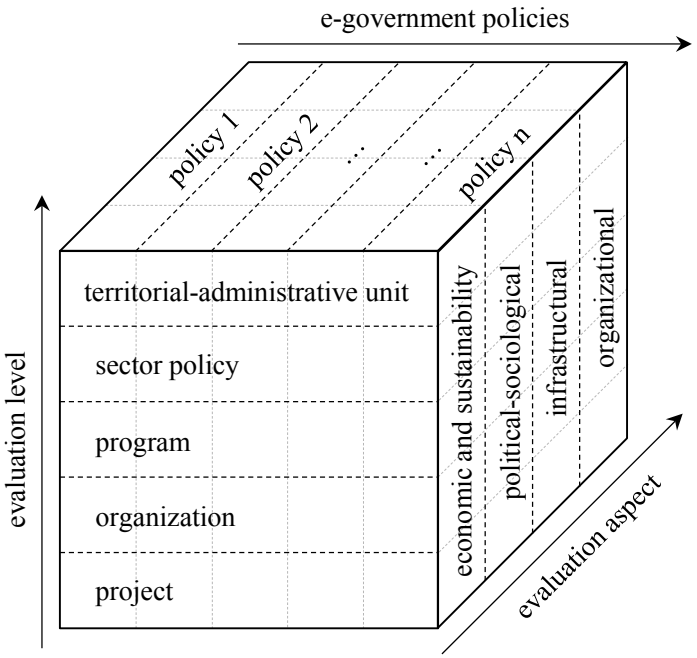

Figure 1: The conceptual model for the evaluation of e-government policies.

The architecture of the conceptual model indicates the complexity of the evaluation process, positioning e-government policies in the counterpoint between the aspects and levels of evaluation. Although the study conducted and later conceptualization of an integrated indicator model confirmed the difficulties in distinguishing various evaluation aspects and levels, and defining relationships between them, especially regarding the establishment and application of the indicators within the individual aspect and level of evaluation, the presented conceptual model facilitates a comprehensive as well as targeted (focusing on individual evaluation aspect or level) evaluation, and provides a more transparent and reliable evaluation process.

4 Conceptualization of an integrated indicator model for evaluation of e-government policies

The basic scheme of an integrated indicator model is derived from the presented conceptual model (see Figure 1) encompassing five evaluation levels, which could be regarded also as different objects of the evaluation: project, organization, program, sector policy and territorial-administrative unit, as the highest political decision-making unit. In addition, each level can be evaluated from four different evaluation aspects: organizational, infrastructural, political-sociological, and economic and sustainability. Therefore, different sets of indicators are needed for each aspect at each level.

Several sets of indicators for the evaluation of e-government policies were identified during the research of the existing indicator models; however, they had to be adapted to our needs, institutional ecosystem and other e-government circumstances Quality indicator model should comprise the indicators which are clearly defined, complementary to each other, measurable in practice and upon which it is possible to conduct a transparent and consistent evaluation process. The comprehensive evaluation of e-government policies requires indicator models which facilitate evaluation at different evaluation levels and from different evaluation aspects. The models must be complementary to each other and integrable vertically (evaluating e-government policy from individual evaluation aspect) as well as horizontally (evaluating e-government policy at individual evaluation level) throughout the process of evaluation. Taking into account the characteristics of the identified indicator models, their analysis results, and e-government policy objectives in Slovenia, we extracted particular sets of indicators for the evaluation of e-government policies. After the refinement of the indicators and removal of the overlaps/duplicates, we incorporated the potential sets of indicators into four evaluation aspects as depicted in Figure 2.

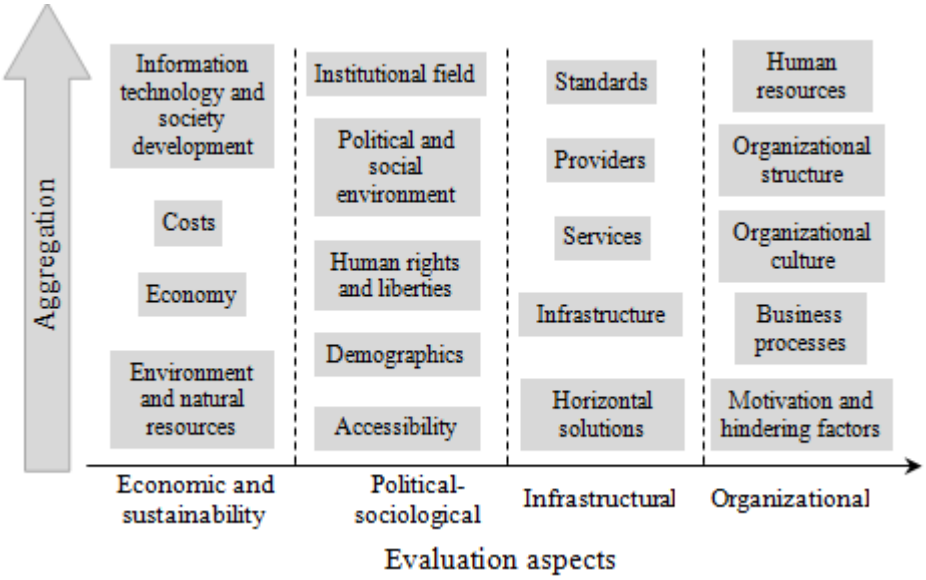

Figure 2: The conceptual model for the evaluation of e-government policies from various evaluation aspects.

This was the first phase in the development of an integrated indicator model for the evaluation of e-government policies. In the second phase, we incorporated various evaluation levels into the conceptual model presented in Figure 2; therefore, some of the above identified sets of indicators were divided into subsets and new sets of indicators for project level were introduced, thus enabling evaluation of e-government policies at various evaluation levels. As a result, an integrated indicator model for the evaluation of e-government policies was developed. Figure 3 presents an integrated indicator model for the evaluation of e-government policies in a form of a two-dimensional matrix: one dimension represents the evaluation aspects and the other evaluation levels.

The proposed integrated indicator model for the evaluation of e-government policies outlines only the potential primary sets of indicators placed at the intersection points of the evaluation aspects and evaluation levels, allowing for incorporation of the different number and sets of indicators. The presented indicator model is only a fragment of a much larger research project, which exhaustively lists and defines operational indicators at lower levels as well. For the evaluation purposes a catalogue of indicators was developed, identifying all the relevant indicators, their object and unit of measurement, history, structure, context etc. The catalogue of indicators is in the final stage of construction and will be available to the public soon. Given the scale and complexity of the research area, the depiction and definition of the operational indicators within the primary sets of indicators exceed the limits of this paper. The structure of the presented indicator model implies that designated categories are not definitive and that their number and contents could be changed and adapted to the specific needs of individual evaluators and environmental circumstances in which the evaluation of e-government policies takes place. An integrated indicator model thus allows alteration of the primary sets of indicators, optional selection of the operational indicators and a different layout and definition of the evaluation aspects and levels within the model.

Development of a comprehensive and practically applicable indicator model for the evaluation of e-government policies is obviously a difficult task. Namely, the majority of indicator models, which have tried to cover several evaluation levels/aspects within e-government policies, are developed only up to the conceptual framework or maximum pilot application. The latter shows that covering larger number of the evaluation levels/aspects usually means that the indicator model has achieved a lower degree of sophistication, which consequently reduces its potential for practical application. This is not unexpected, since the focus on several evaluation levels/aspects means more complex indicator model structure and a larger number of indicators, which exacerbates the transparency and complicates the use of the indicator model itself. Research results indicate that achievement of the highest degree of sophistication and practical application of the indicator model for the evaluation of e-government policies is largely dependent on the number of evaluation levels/aspects the indicator model is focused on, and vice versa, meaning that the comprehensiveness of the indicator models is to a large extent conversely related to their degree of sophistication. The current state of affairs concerning the improved evaluation, planning and implementation of e-government policies in Slovenia

is rather discouraging. Given the existing political debate, focusing predominantly on economic issues and rigorous budgetary restrictions, and disregarding the support for the development of more applicable indicator models in the field, the current e-government situation is likely to remain unchanged for some time. Irrespective of the fact that renewed and complemented indicator models could assist policy-makers in all three steps of the ICT policy-making process, namely: agenda-setting, option-formulation, and implementation. Disturbing socio-economic situation in Slovenia could jeopardize the latest reform efforts and compel the government to concentrate on predominantly short-term economic issues and lower the investments for the development of e-government in general, which could result in far-reaching implications for the public sector.

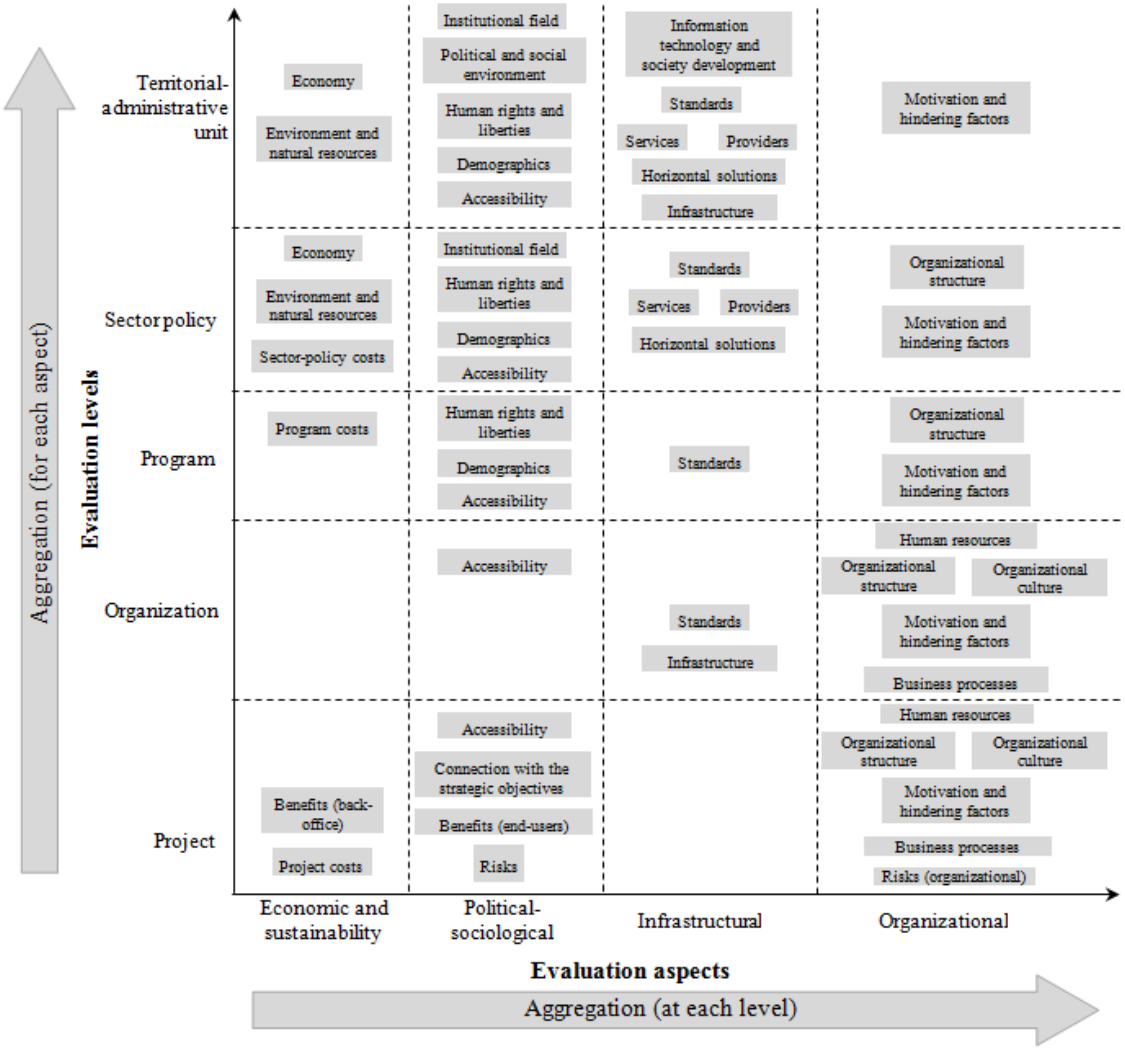

Figure 3: An integrated indicator model for the evaluation of e-government policies.

5 Conclusion and future work

The main problems concerning the implementation of the particular e-government policy and general development of e-government in Slovenia are largely a consequence of underdeveloped quantitative and qualitative instruments for supporting the better evaluation and planning of e-government policies. Despite the numerous difficulties encountered in the course of conceptualization of the presented indicator model, which are mainly related to the lack of a uniform theoretical basis and the complexity of the field, the paper is trying to overcome the deficiencies of the existing indicator models and establish a groundwork for the development of an integrated indicator model which could provide an applicable support and facilitate better quality evaluation of e-government policies.

The results of the proposed research are important for several reasons. The conducted analysis provides a valuable insight into the current e-government evaluation practice and facilitates the exposure of inadequately evaluated areas and dimensions of e-government. The development of an integrated indicator model and corresponding tools could represent an important progress in the field of e-government metrics research and may be used as an analytic platform in the course of decision-making and adoption of the future e-government strategies and initiatives. Methodologically, the developed indicator model could be adapted to the evaluation of public policies in other fields and applied in other environments as well. In addition, a strong point of the presented indicator model is the fact that it enables simultaneous evaluation of e-government policy impacts at several levels and from several aspects; including qualitative evaluation, ranking and also explicit presentation of the results, using appropriate ICT solutions. However, the indicator model does not represent a universal solution to the important problems addressed in this research in the self-sufficient form. Besides difficulties related to the selection of the most relevant indicators and their optimum weighting, various shortcomings in the utilization of the indicator model can be seen mainly in the objective limitations of the political, regulatory and organizational nature within the public sector organizations. Despite revealed inadequacies, an integrated indicator model could, in coordination with other measures in public sector organizations, considerably reduce risk and costly mistakes in the implementation of e-government policies and facilitate improved inclusion of the public interest aspect in the future e-government initiatives.

The present public finance situation along with increasingly stringent austerity measures require careful direction of further e-government investments, particularly focusing on the proficient development of suitable ICT-supported solutions which could enable enhanced policy making procedures and optimization of the public sector in general. A wide range of research and existing indicator models reveal that the past development of e-government, and particularly e-services was based primarily on political preferences and only exceptionally on professionally verifiable and measurable impacts of these services. Evidence-based evaluation of e-government policies could consequently initiate more user oriented, cost effective and performance-based development of e-government. Addressed shortcomings and limitations will have to be resolved, in order to ensure the effective evaluation and implementation of e-government policies, and ultimately accelerate the development of appropriate e-services with added value for all stakeholders.

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