Challenges in E-government: Conceptual Approaches and Views

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Abstract—**The governments invest big amount of funds to realization of e-government projects for further upgrade of services supplied by the government to citizens and reduction of costs in whole world. From this point of view, development of scientific-theoretical principles of forming the e-government is of great importance. Current research reviews several relevant issues regarding e-government such as the definition of e-government, advantages of e-government implementation, the monitoring of forming processes and management, the intellectual analysis of web-resources, information security and electronic democracy problems and it focuses on the challenges of e-government implementation. Results of research may specify researchers in their continued investigation of e-government implementation, especially in the context of developing countries.**

Keywords—Electronic government; public administration; information security, web-analytics; social networks; data mining.

I. INTRODUCTION

Nowadays, the wide implication of information technologies in developed countries is affecting their social-economic development. The number of citizens, centers, organizations, institutes having access to and using internet for satisfying their needs is being rapidly increased. In this situation, there is an increasing need for more mobility and interactivity in transparency principles of public services and neutrality principles from political point of view. Note that the opportunities of political and social technologies in administration are being widened.

In some sources, "electronic government" term is used during translation and different definition, especially in the developing countries. As "electronic government" is currently under construction especially in the developing countries, it has not been fully formed as a definition. As shown in relevant documents, it does not only include the central executive authority, it also includes the three branches of government – the executive, the legislative and the judicial [1]-[3].

The conducted research shows that the definition of implication of the electronic government (e-government) is expanded not only as application of information technologies, but also as a tool of administration of public services in the world. Sometimes, as a key of success of e-government, Customer Relationship Management (CRM) systems are indicated [4][5].

The forming of national e-governments in post-industrial countries is carried out based on reform of all public administration system. The main objective here is the compliance of public administration with Information society. Modern public administration contains its substantial clarity, transparency, competition environment, and responsibility for the outcomes of its actions, increase of the role of ethical requirements, and active mutual relationship with civil society. It is essential that, during the use of Information - Communication Technologies (ICT) in public administration, also other factors affecting the character of socio-political, economic, cultural, mental, and government-society relationships are considered.

Wahid [6] provides a literature review on e-government in the context of developing countries published between 2005 and 2010. Results of research may guide researchers in their continued investigation of e-government implementation, especially in the context of developing countries. Some research direction were provided: paying more attention to research paradigm and methodology, preserving multiculturalism in e-government research, improving the research quality, developing conceptual basis of e-government, etc. [6].

Last research works provide an analytic review of the literature on the diffusion of e-government. In research works analyzed the related literature in the relevant journals and from international conferences in the field of ICT and public administration. Analytical results reveal the main conceptual and architectural principles, research methods, and research topics found in the relevant literature. Main research topics are included: the factors that influence the diffusion of e-government, e-government systems and applications, the impacts of e-government to public authorities and citizens, the relationships between ICT infrastructures and the influence of e-government, etc. [7].

Nowadays, the governments invest big amount of funds to realisation of e-government projects for further upgrade of services supplied by the government to citizens and reduction of costs in whole world. The governments can increase the efficiency of actions and carry out administrative operations more easily by using ICT. By considering this important fact, the specification of researches in direction of e-government establishment and also the most successfulle applied models and their research are remarkably necessary. From this point of view, development of scientific-theoretical principles of forming

the e-government is of great importance. By considering the international practice in research, some up-to-date scientific-theoretical problems of forming the e-government has been researched.

II. THE CONCEPTUAL AND ARCHITECTUAL PRINCIPLES OF E-GOVERNMENT

It is known that e-government has started forming in the cross of two centuries. It is known from history that, each transition to new quality has been accompanied by several complications, sometimes by serious crisis. Following this experience, the government can prevent the possible social-economic crisis by modernizing the public administrative mechanisms. In this regard, the government was required to conduct some reforms for the transformation to a new phase in public administration. The transition to a new phase necessitates the conduction of important scientific-research works.

Literature review on e-government shows that potential factors of e-government implementation and classified these factors into four categories: institutional, resource-related, access-related and legal aspects [8]. Chen et al. [9] propose a set of elements for successful implementation of e-government. As for the benefits, such as efficiency and effectiveness in public administration, more countries are working towards adopting e-government [10]. Researchers suggest that e-government adoption is not merely a technological issue; also it is influenced by other factors such as human, social, cultural and economic aspects [11]. The implementation of e-government in developing nations faces many challenges [12].

Alshehri et al. [13] reviewed the updated the available literature about e-government implementation stages, its challenges and benefits. It reviews several relevant issues regarding e-government, such as the definition of e-government, implementation stages, the advantages of e-government implementation and it focuses on the challenges of e-government implementation [13].

According to "Electron government" law of USA dated 2002 [14], this term was accepted as an expansion of access to government information of agencies and government structures by means of information technologies and Internet, also as an implication of information technologies and the use for the increase of efficiency [14]. In official documents, e-government is comprehended as a mutual relationship system with information character of local government authorities and the society by using ICT. "Gartner Group" company reckons that e-government – is the concept of administration by incessant optimisation of services process, participation of citizens in political processes, also by changing of internal and external relations with the help of technical tools, Internet and modern mass media [15].

In some research works, "electronic government" term is defined as Internet-Technologies providing the informative mutual relationship of government authorities with population and civil society institutions. E-government is specified as an integral, socially responsible enterprise having regular counter-relation and open to information.

In general, e-government is specified as a mutual relationship between specialised complex system of public authorities and citizens, civil society and business structures by means of Internet. The following steps of a mutual relationship, Customer-to-Business (C2B) – between citizen and business; Business-to-Business (B2B) – between private companies; Government-to-Citizen (G2C) – between government services (on goverment, departments and regions level) and citizens; Government-to-Business (G2B) – between government and business sectors; Government-to-Government (G2G) – between public authorities can be shown.

Note that the conceptual model of e-government is based on government structure existing in countries of democratic society and market economy (Figure 1b). Conceptually, the approach of this problem, the reforms conducted in public administration in the beginning of 90-s showed the larger share of government in forming of e-government (Figure 1a).

Alongside, it must be considered that the society not only obtains the access to information, but also gets the opportunity to affect the decision-making process of government and participate interactively in the process of preparation of decisions; as a result, the transparency of public sector performance increases.
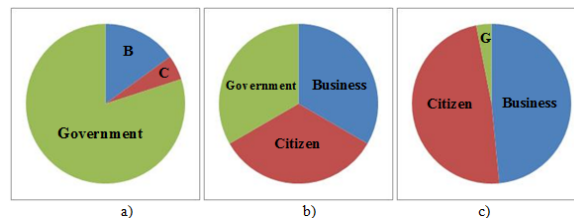

Figure 1. Evaluation model of E-government.

In general, e-government creates new opportunities for development of democracy. It provides the mutual information relationship between citizens and civil society institution and public authorities by means of ICT. In other words, e-government comprises the mutual relations system of citizens, civil society and business-structures, and executive government structures by means of Internet. Implication of ICT in government performance, transparency and accessibility of government information, feedback principle between citizens and public authorities, government responsibility for the decisions made, etc.; issues in different countries are the main characteristics specifying e-government.

It is essential that the transformation to Information society, e-government strategy based on democratice values necessitates the gradual change of government model, the increase of share of civil and business structures, minimization of government share (Figure 1c).

According to definition of European Committee, e-government - is the use of ICT in public structures and improvement of performance of government employees and public authorities in the background of realization of

organizational reforms and forming of skills directed to the increase of level of services provided by them [16].

According to the concept of e-government, the whole system of public authorities performs as an integral service organization for the provision of services to citizens. The performance of e-government must be clear, transparent and available in terms of information for citizens. The specific attention is drawn to establishment of feedback mechanism, efficiency of services provision and execution period by using the centralized systems. These all enable to increase either the quality of provision of services provided by the government to citizens, or the performance efficiency of government.

III. THE ISSUES OF ASSESSMENT OF FORMING PROCESSES AND MANAGEMENT OF E-GOVERNMENT

One of the up-to-date issues regarding e-government is the assessment and monitoring its forming processes. It can be justified that e-government is an online environment with the quite complicated structure. On the other hand, e-government is the sum of vertically and horizontally interrelated corporative information spaces.

The issue of establishment of complex indicators system for the monitoring of the efficiency of governance and the use of ICT in different areas, the methodology of practical implication has been started to forming at the end of 1990's [3][17][18]. Nowadays, the existing practical experience and methodical potential for the assessment of the electronic readiness, the monitoring, potential analysis and comparative analysis of governments are present. As such methodologies, one can mention some well-known ones; (i) e-government development index of United Nations regarding the forming and the use of e-government [19], (ii) networked readiness index of World Economic Forum [20], (iii) ICT development index (IDI) of International Telecommunication Union regarding the assessment of Information society [21], (iv) digital opportunity index, an indicators system for the assessment of development level of e-government of European Union countries (Capgemini company) is presented in [22].

The implication of international indexes for the development of methods of the assessment and monitoring of e-government forming processes can be considered as an important factor. Also, note that the position of the country in international ratings has a great importance in terms of the position of the country attained in the region. These indicators exhibit the carrying out of development strategy of Information society of the country.

Note that alongside with the assessment and monitoring of digital differences either at national, corporative or at enterprise level; these are the important information for carrying out of expedient management of the forming process of aimed electronic environment (e-environment).

Taking into consideration the necessity of realization of 5 sequential phases (communication, computerization, networking, informatization, and virtualization) of e-environment forming, the balanced relation must be provided among the separate phases of it. Management centers are the

intellectual systems enabling the efficient decision-making bases on the indicators characterizing the progress of the process.

The following can be shown as the indicators characterizing the virtualization, socialization phase in e-environment:

- The indicators characterizing the social networks created in considered e-environment;
- The indicators characterizing the classification and activeness (age, specialty, gender, space, time, etc.) of users;
- Classification and rating indicators of used contents;
- The indicators characterizing the transparency, accessibility and sequences of information in e-environment;
- The indicators characterizing the virtual relations established and contents turning over in e-environment, etc.

It is essential that the solution of several problems (technological, normative-legal base, cadres' education, scientific, etc.) is an important condition. By taking into consideration the leading practice, e-government establishment in country must be formed based on both horizontal and vertical management principles. From this point of view, each institution included in e-government must have an action plan, the indicators characterizing its plan must be specified the management of this process must be executed and the continuing (or on specific cycles) monitoring must be carried out.

Nowadays, the monitoring and assessment issues have a timely importance for the realization of e-government projects, programs specifically. From this point of view, it is complicated to assess on which phase country is in realization of e-government program. Different sources rely on information that is not always based on honesty, reliance by making specific results for themselves. From this point of view, there is a need for establishment of complex system of assessment and monitoring. The indicators accepted at international level and parameters meeting the local needs must be included in the system itself.

IV. INTELLECTUAL ANALYSIS ISSUES OF WEB-RESOURCES PERFORMING IN E-GOVERNMENT ENVIRONMENT

While considering the e-government programs carried out in different countries of the world, it becomes clear that e-government will be more accessible and efficient under the "single window" principle in the near future. This is mainly related to rapid development of content mining methods, web technologies and social networks [23]-[26]. From this point of view, the analysis of web-resources and development of management mechanisms is of great importance in carrying out the e-government projects.

The implication of web content mining, web-analytics and social networks are strong tools in improvement of e-government management effectiveness and establishmet of feedback mechanism. If ones consider that one of the main

issues in realisation of e-government programs are the analysis of web-resources and establishment of the effective management policy, then the implication of innovations, new technologies widens the communication capacity significantly. This, in turn, enables to achieve new integration forms between business sector and citizens.

Web-resources creates online interactive social communication environment between public authorities and citizens. More information is gathered in this environment eventually. Thus, new opportunities are created for the intellectual analysis of web-infrastructure and more efficient management of the society.

The internal structure of the electronic community existing inside each online environment in disguise can be revealed by applying the social networks theory. The analysis of e-government web-infrastructures, web mining technology can be implied for obtaining the following information [23]-[25]:

- Which issues are mostly discussed by the citizens;
- The monitoring whether the discussions are related to government sector;
- The classification based on different criteria's (space, time, age, specialty, activeness, etc.) of citizens applying mostly to which institutions;
- The online monitoring of realisation status of requirements claimed against web-resources;
- The classification based on different criterias (countries, institutions, issues, time, etc) of inquiries to web-resources from foreign countries performing in e-government environment, etc.

An effective web analytics of sites, portals and also, sites providing online services to citizens – is revealing existing program, technical, content related errors and adjustment to requests of citizens, and users. By using web-analytics, the reasons for leaving the site by users, their actions, and behaviors at web-site regarding a site or particular service can be revealed. It is clear that web-analytics is not limited with particular statistics and enables to obtain more detailed information for analysis.

To analyze log-files gathered in servers, information gathered in e-mails play a prominent role in effective decision-making by e-government parties in the process of establishment of online relations between citizens and public authorities [23][24]. This, in turn, enables the development of feedback mechanisms for e-government management.

V. INFORMATION SECURITY PROVISION ISSUES OF E-GOVERNMENT

People became more dependent on information as society gets computerized. Non-provision the information security can cause major consequences for the society. The priorities of information security in a particular country are specified based on the balanced ratio of government, society and citizens interests. As one of the main components of the safety of society, the duties of information security are the confidentiality of information, information integrity,

information accessability and the fight with harmful computers [27][28].

Information security is critical in e-government initiatives. Confidentiality of any information available on the network is crucial point. All data and whole the government document and other important material have to be protected from unauthorized persons in case of realizing e-government initiatives. Information security is critical for successful realization of such initiatives [29].

E-government forming has created new options of interactions between government organizations and citizens in the delivery of government services. Of course, these interactions have needs for maximum information security. In general there are five broad requirements of information security in e-government: confidentiality, integrity, availability, authenticity, and accountability [30]. Developing effective information security practices requires of both the technological perspective and the socio-organizational perspective [31][32].

Efforts have been made to develop frameworks for ensuring information security in organizations. For example, propose an information security culture framework to heighten information security awareness in organizations [33]. Martin [34] recommends a total quality management based framework to manage information security in organizations. These studies have shown the opportunities of individual frameworks for maintaining information security in organizations from different perspectives.

The several issues with technical and administrative-legal characters must be solved for carrying out the e-government program. The preparation of mutual relationship reglaments, the creation of government services classification, also integral technical architecture, realization of program platform and the provision the information security can be indicated among them.

For the provision of normal performance of e-government, it is necessary to provide the security of each level constituting e-government.

In general, the up-to-date issues in the framework of provision the information security of e-government we can classified as following:

- Development of conceptual-architectual models for provision and management of e-government information security and sustainable performance;
- Development of models for the analysis of information security risks and management;
- Development of cybercrime defences technologies;
- Revealing the disguised criminal social networks creating threats for e-government environment and development of analysis methods;
- Development of intellectual monitoring system of corporative network environment;
- Development of spam busters methods and algorithms by means of data mining technologies;
- Protection of individual information in e-government environment and development of user-oriented security mechanisms;

- The creation of Computer Emergency Responce Team (CERT) in e-government environment;
- Investigation of information war, information attack and information attack defences technologies and development of new methods and algorithms.

Note that a complex and systematic approach is required to information security provision issues of e-government. With the development of Information society, the necessity of establishment of integral and multilevel nation-wide information security system appears in the process of e-government building. In general, building the Information society perplexes the provision the information security of countries and the sole fight against threats of different nature and scale. Thus, building the global information security environment must be of interest of all countries, civil societies, companies and people.

VI. E-GOVERNMENT AND ELECTRONIC DEMOCRACY ISSUES

Different factors are considered as variables which impact electronic democracy (e-democracy) based on e-government literature. E-government is not only a term that refers to the transformation of public services, so-called e-governance, but also about the transformation of political systems, so called e-democracy. E-democracy is considered such organisation form of citizens' social-political activity that the wide use of ICT provides the establishmet of more effective relations at new level either among citizens, or between citizens and government bodies, civil society and business sector [35][36]. In other words for the strengthening of democratic institutions, the expansion of participation of citizens in political activity and the use of ICT constitues the essence of e-democracy. E-democracy term means the consideration of citizen's thoughts and the engagement of citizens and organisations to political relations and processes. In this phase, the issue of how close the citizens are engaged in social-political processes is characterized with electronic citizen problems.

Starting from initial phases of awakening of e-democracy, the provision of access opportunities to socially important information of government bodies by the citizens was constrained by creating of voting opportunities regarding partiular decisions of the government [35]-[37]. The further development has widened the opportunities of both sides, the citizen and the government and close participation of citizens in social-political processes was provided. This meant the establishment of the opportunity of expressing the thoughts by citizens in any level of decision-making and the notworthy increase of transparency.

The following are related to e-democracy mechanisms [35][36]:
- Electronic voting (voting with mobile phone, Internet-elections, etc);
- The collective discussion mechanisms of subjects with social-political content and socially important issues in online regime;
- The forming mechanisms of online communities, groups, social networks;
- The mechanisms of realisation of citizens' incentives;
- Citizens' control mechanisms on public authorities' performance, etc.

Figuratively speaking, the main currency of the democracy is information and communication. With these two, the citizens are self-organised, start to govern themselves and e-citizen is shaped. Social networks, blogs and others play a prominent role in forming of civil society. For the civil society, this means that the horizontal relations system is being shaped and self-governance opportunities (municipalities, non-governmental organizations, etc.) are created, i.e., it takes some functions of the government. Other functions are carried out by the business sector.

Alongside with what was mentioned above, the transition to Information process does not require only an automation of existing processes in government management, but also their re-building based on particular interests of citizens and a group of interests of the society. Considering those principles, nowadays, the direct e-democracy projects are not sufficiently supported by the business sector. E-democracy concept has several inconsistencies and is reasonably criticized. Hence, recently e-government concept is dominant in socio-political and scientific literature, which is the basis for carrying out the reforms in government management sphere by means of ICT.

VII. CONCLUSION

During the review of practice of leading countries, it is revealed that existing e-government projects have different objectives and different models, conceptual approaches are suggested by institutions, organizations for the development of e-government. By considering this fact, the inspection of research conducted in direction of e-government establishment in international practice is remarkably necessary. By considering the international practice in research, some up-to-date scientific-theoretical problems of forming the e-government has been researched. In research work, reviews several relevant issues regarding e-government such as the definition of e-government, advantages of e-government implementation, the monitoring of forming processes and management, the intellectual analysis of web-resources, information security and electronic democracy problems and it focuses on the challenges of e-government implementation. Some conceptual and architectural principles of forming the e-government are investigated and some recommendations are given.

Important research directions were specified by considering the main principles of e-government concept. Results of research may specify researchers in their continued investigation of e-government implementation, especially in the context of developing countries.

In future researches, the specific attention will be drawn to establishment of feedback mechanism, efficiency of services provision and execution period by using the centralized systems. These all enable to increase either the

quality of provision of services provided by the government to citizens, or the performance efficiency of government.

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