The Presenting a Model for Municipalities E-Readiness Assessment

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ABSTRACT:

Information technology growth and development has caused to significant revolution in the daily life of the modern societies. Changing organizational approaches in their activities methods has been presented with IT development simultaneously by scholars and endeavors have been continued to discover its various dimensions. E-Readiness, a concept that has been stated 3 decades ago, means the degree which a country, society, an organization utilizes and accepts ICT (Information and Communication Technology). The present research aims at assessment of municipality E-readiness as a public and nongovernmental organization which is commuting with citizens increasingly. Thus, all organizational E-readiness models have been reviewed and an E-readiness assessment model has been created for municipality after taking experts' opinions into consideration. The model, then, has been weighted and has assessed municipality. The results, then, have been analyzed and some suggestions have been presented according to the analysis for the municipality.

The model has four dimensions: "Security and Technical Infrastructure", "Human Resources Readiness", "Legal and Judicial Framework", "Policies, Strategies and Management Readiness". This model has been created for a public organization such as municipality for first time and presents a great tool to recognize municipality's weakness and strengths.

Keywords: *E-Government, Information and Communication Technology, E-Readiness assessment, Municipality*

INTRODUCTION

Throughout the world, governments and public-sector authorities are increasingly using information and communication technology (ICT) to provide agencies that are accessible to the public 24 hours a day, seven days a week. The term "e-government" has been introduced into practice and research to describe these developments. The European Union (Commission of the European Communities, 2003) has defined "e-government" in the following terms: "The use of information and communication technologies (ICTs) in public administrations combined with organizational change and new skills in order to improve public services and democratic processes and strengthen support to public policies.

Some scholars have argued that the emergence of e-government represents a paradigm shift in the organization of the public sector that will have a profound effect on public administration in terms of technology, cost-efficiency, risks, and benefits to the public (Akesson et al., 2008).

E-government has been introduced to reform the way a government is administrated. The

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advocates of this movement believe that through this, the government will have better outputs including increase in service quality, cost-efficiency, expanded political participation, and more efficient policies and programs. Using communication and information technology is another reason that makes e-government more worthy of attention. (Helbig et al., 2008).

Nowadays, IT as an axis for Information communities is under attention by most countries of the world, so that it has been given a special status in their development plans. The increasing number of citizens' authorities through allowing access to information, improvements made in the relation between governmental organizations, commerce and industry, improvements made in clarity and precision of governmental works, growth in governmental revenues and decrease in expenses, development of a better sense of social participation and improvements in efficiency of economic systems are all advantages and facilities not possible without establishment of an e-government or an e-city. In fact, governments have understood that this is a vital need for modernizations, performance improvement, strengthen and stabilizing of competitive position in global conditions. (Bridge, 2005). Therefore we should study the ways and means of applying this technology in all social, economic, political and cultural domains. Communities and organizations must be assessed for their electronic capabilities and this is more prior than planning for achieving organizational optimum goals (Fathian and Mahdavinour, 2008).

E-Readiness (Definitions)

According to the definitions presented in Computer Systems Policy Project (CSPP[1]) in 1998, a community is ready electronically if it has access to networks in a competitive market at a high speed and sustainable access to ICT in schools, public sectors, economic agencies, health centers and houses. On the basis of these definitions, the degree to which communication and information technology has penetrated in the houses, economic agencies, health centers and public offices is the base for assessment of electronic capabilities of a community (Fathian and Mahdavinour, 2008).

According to Asian Pacific Economic Cooperation (APEC[2]), a country is believed to be electronically ready if it has a free commerce, lawful industry, and ease at commerce, in coordination with public standards and commercial agreements (APEC, 2000).

World Information Technology and Services Alliance in its definition presented in 2000, stated that electronic readiness implies personal security for customers when they are involving with E-commerce, better security technology, more trained employees and less training expenses, less limitations on policy making, doing businesses in a modern way concordant with information era and less e-commerce technology expenses (Mutula and Brakel, 2006).

According to Center for International Development (CID) at Harvard University, a community is electronically ready if it is equipped with the required physical infrastructures of information and communication technology such as telecommunication network with wide band, confidential access and low price. In such a community, electronic methods are applied in commerce and it has a proper market of information and communication technology. Such a community has native rich contents in social and cultural domains and has online organizations. Information and communication technology is used daily and is taught in schools. In public sectors, e-government services are used. Moreover, it has a strong competitive industry in the domains of telecommunication, independent laws, and it has access to global investments and commerce. (CID, 2005). As the last definition, according to McConnel International, e-readiness is a country's capability in utilizing digital economy (McConnel, 2005).

Significance of E-Readiness

Recently, so much attention is given to digital divide. This term was first introduced as a policy making issue in reports prepared for the US government. The US government did its best to clarify the meaning of this term and from mid-1990, digital divide turned to be the unique term sued by bureaucrats , legislatures, politicians and academicians (Helbig et al., 2008). Usually, digital divide is defined as inequality among nations in owning and using computer and

internet. This digital divide can be considered as a global apartheid and like a catalyst can intensify the rate of social and economic inequalities in the global village. Hence, under any conditions, lack of digital readiness in social and economic domains shall be considered to solve the problem. Within the past decade, this was one of the most important agendas of the International Bank, UNESCO[3], and the World Summit on the Information Society (WSIS) (Wijers, 2011). The International Bank has been publishing some reports since 1990 onwards, in which information technology- in general - and internet developments –specifically- have been presented as the most important issues in development of countries. Discussions in G8[4] meetings between 2001 and 2005 reveal that access to information technology have been the key axis of these discussions. When the discussion on digital divide became more intense, electronic readiness assessment tool was developed. The gaps exist between countries of the world is called digital divide. Having this in mind that the degree of digital divide is increasing, statesmen and economic agencies have to use some legal frameworks in using communication and information technology. To decrease digital divide, all above requirements have to be met with an integrated strategy that can account for all native demands (Fathian and Mahdavi Nour, 2008).

Statesmen may assess the degree of electronic readiness to assess their current status. They can identify the domains in which they need foreign supports. By better understanding of electronic readiness processes, leaders can design and administer communication and information strategy better. Many statesmen believe that communication and information technology can help their countries solve their social and economic problems and they are ready to make the changes required to utilize these new technologies. Electronic readiness assessment is the first step to change the goals into planned actions (World Bank, 2005).

Background of Electronic Readiness Assessment

Electronic readiness is a new concept which has been developed due to rapid penetration of internet across the world and significant progresses in ICT usage in the domain of

business and industry (Mutula and Vanbrakel, 2006). The first attempts in providing a definition of electronic readiness were made in 1998 by Computer Systems Policy Project (CSPP) (Mutula and Vanbrakel, 2006). This electronic readiness model is defined as a society's readiness for participating in network world. After development of the first electronic readiness assessment tool, several assessment tools were developed by development agencies, research organizations, universities, commercial companies and individuals. Some leading organizations active in the domain of developing electronic readiness assessment tools include:

- ✓ World Economic Forum (WEF)
- ✓ Asia-Pacific Economy Company (Bridges, 2005)
- ✓ McConnell International with a tool named Ready? Net, Go!
- ✓ Center for International Development at Harvard University with a tool named Network Readiness Index
- ✓ Economist intelligent unit with a tool named E-readiness Rankings
- ✓ United Nations Conference on Trade and Development (UNCTAD) with a tool named ICT development index
- ✓ Mosaic Group with a tool named Framework for Assessing the Diffusion of the Internet, International Business Machines Corporation with a model named Readiness for Network World
- ✓ United State Association for International development with a model named Communication and Information Technology Assessment, in 2000.
- ✓ Emperica Gmbh in Germany prepared a report on Electronic Europe Benchmarking Framework in 2001 based on the project of Statistical Indicators Benchmarking the Information Society (Emperica, 2001).
- ✓ Bui et al. (2003) conducted a research in titled " a framework for assessing national electronic readiness "
- ✓ International telecommunication Union (ITU) presented a model named Digital Access Index (DAI) in 2003.
- ✓ UN Conference on Trade and Development prepared a report on Information and Communication Technology Development Indices in 2003.

Table 1: EMM model dimension and indicators

Dimensions	Indicators
Business strategies	Defining strategies, analysis of competitors, using information technology
Organization and competencies	Does organization need new trainings, new competencies, new work method?
Channels management	Distribution canal, marketing, logistic management, knowing customers' demands
Performance management	How does an organization design, measure, monitor and control its competencies and functions
Tactic and logistic operation	Daily operation, financing
Systems and technology	Enabling technologies, integrated software, tendency to use technology, security and confidentiality
Tax and law	For the purpose of knowing business and customer rights- reliable potentials and obstacles of the environment.

There are also several electronic readiness assessment models presented within organizations:

1- EMM model prepared in a joint cooperation with Melon Kamji University, which has developed a framework for assessing electronic businesses and is named electronic business mature model. The dimensions and indicators of this model is presented in table 1 (Xirogiannis and Glykas, 2006).

2- Perceived E-Readiness Model (PERM) prepared as a joint cooperation between Manchester University and Oakland University in 2003, is the latest version of E-readiness presented so far. The model constitutes of two structures:

Perceived Organization Electronic Readiness (POER) includes:

✓ Being aware of electronic business elements in environment allows perceiving their meanings through information technology, and allows perceiving business models, demands, benefits and threats, and planning future business trends and its effects.

✓ Human resources: Having access to experienced employees in the domain of communication and information technology and other skills (like marketing and business strategy).

✓ Business resources: This includes free organizational communications, acceptance of risk in business relations and in the existing business and investment for information technology projects.

✓ Technical resources: This includes developing computerization, flexibility of existing systems and analysis of web based applications.

✓ Commitment: sufficient force for supporting electronic businesses, defining laws for protecting customers, having a business strategy and perspective, pervasive support of ideas and electronic business projects.

Perceived External Electronic Readiness (PEER) includes:

✓ Government's e-readiness: This includes the organizations' assessment of government's E-readiness and of E-readiness of government related institutes, for promoting, supporting, and facilitating E-businesses and satisfying the respective demands.

✓ E-readiness of Supportive Industries: This includes assessment of presence, development, service level and cost structure of institutes that supports (Almayehu et al., 2005).

3- E-government potential test model: This model was presented by KPMG consulting company in 2000, under the name of Electronic Government Potential Test and it was tended to be used across federal organizations of Canada and it includes:

✓ Electronic strategy: Electronic strategy, guidance and leadership, correction of the existing laws, formulating internal regulations, plans, policies and allocation of resources.

✓ Architecture: business model, data security, applications (software and improving them), web technology (access level), maintenance and improvement of database.

✓ Project and risk management: risk management, project management and change in business.

✓ Organizational capabilities including: E-government capabilities, E-government skills and tools and training, organizational learning.

✓ Value chain management: relation with colleagues, integrity of value chain and assessment of general readiness.

✓ Performance management: Customer satisfaction, confidentiality, safeguarding achievements, reporting E-government maturity (Kazemkhanlou, 2003).

4- Model of Assessing Electronic Guidance in public ministries and offices (P313): IMRB technology group has presented a model to assess level of electronic leadership in public ministries and offices, which includes:

✓ Readiness for electronic Leadership/IT: This includes understanding electronic leadership, importance of information technology in task performing.

✓ Information technology policy: This includes action program, situations, and responsibilities, acting concordant with plans, benefits of information technology action program, investment and legislating the required laws.

✓ Human resources: This includes the responsibility of IT, the primary knowledge of working with computers, training and development of IT.

✓ IT infrastructure: This includes hardware/ software infrastructure, web infrastructure, website infrastructure for communications, internet, access level, electronic data.

✓ Processes: This includes reengineering of business processes, process reaction network, maintenance and updating database, process automation status, process coordination and integrity status, security

mechanisms applied, improvement in applied programs.

✓ Measurement of advantages: This includes the benefits resulted from using information in processes, return on investment in using information technology in the processes, and the effects it has on productivity when IT is used in processes. (E Technology Group, 2003).

5- Commercial Intelligence Maturity Model: This model was presented in 2007 by Decision Path Company and is focused on raising the level of importance given to commercial intelligence. The model includes:

✓ First level: Ordinary using of information in the same unstructured method they have prior to being entered into database. Demands for information are concerned with this question: what users tend to have access? Applications for data are in the form of data-factor which is sent by end user to IT section.

✓ Second level: Information found real roles. End users do not show tendency to what they need, rather they seek for why they need. Moreover, they seek answers to questions like who, when and where. This information is proper for commercial processes (Business to Employer, Business to Business, Business to Government, Business to Customer) which are after business goals.

✓ Third level: At the last step of commercial intelligence maturity, all organizational units are involved in where to use information. Attention is paid to commercial processes management and organizational changes. Organization understands that decisions making processes were not optimum before having access to on time information and it tries to substitute them with new decision making processes in order to optimize using information across organization (Williams et al, 2007).

6- MIT E-Readiness Model: MIT E-readiness Research Team has developed a framework and a data model as a tool to assess E-readiness, in order to collect the pertinent data. This model has used three dimension s to assess E-readiness and these include:

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✓ Access: Including infrastructure (for instance number of ISPs and wireless penetration coefficient), Services (for instance: Website and Internet Using, Telephone charges, post services and etc.).

✓ Capability: Including three dimension s of social (for instance: rate of literacy or poverty indicator), economic (for instance: GDP[5], number of credit card accounts) and strategy regulations and laws (for instance: competition by telephone or free commerce).

✓ Opportunity: This includes applications to which we has paid no attention so far, such as E-banking, business to business services, business to customer services, business to government services, customer to customer services, marketing and searching for information (Choucri, 2003).

RESEARCH METHOD

Scientific researchers are divided into three classes as far as the research goal is concerned: fundamental, applied, research and development (Sarmad et al., 2008). This research is an applied one as far as its goal is concerned. An applied research is an attempt to answer a practical problem that exists in the real world (Khaki, 2008). In this research we tend to assess the present E-readiness of municipality. The research method is descriptive. The goal of some researches is the blow by blow explanation of a situation or condition. This type of research tends to answer questions such as how much, how, what is happening. A descriptive research describes things that exist and focuses on existing relations and conditions, common beliefs, current processes, tangible effects or developing trends. The main focus at first place is on present time, although it sometimes deals with past events that have resulted in the present status. (Khaki, 2008).

To complete theoretical references, library and internet were used to search for books, essays and case studies in Persian and in English and at the stage of surveying, the experts' views were used for testing, model improvement and determination of weights of indicators. For this purpose, four questionnaires were prepared.

1- First questionnaire was sent to 12 university professors active in the domain of IT, by e-mail or in person, to attract their attention to the dimension s and indicators of the primary model.
2- Second questionnaire was prepared with the aim of giving weight to dimensions and indicators of model and was submitted to IT experts of municipality, in person.
3- Third questionnaire included questions for assessing indicators, and had to be answered by managers.
4- Fourth questionnaire included questions for assessing indicators, and had to be answered by IT experts of the municipality.

Place and Time of Research and Statistical Society

The place of research was Municipality and all its subsidiary organizations and deputies and it began in October 2011 and ended in May 2012. The statistical society includes all IT experts and managers of municipality. There were 35 managers, and 20 IT experts included in the research; hence, the total statistical society was considered for research and no sampling was made.

Validity of Measurement Tools

to assess the validity of research model, the assessment questionnaire were sent to 12 communication and IT elites who were also university professors holding Ph.D. and they were asked to announce the degree to which they agree with the assumed framework by choosing either of the five scales provided for them. Next the structural problems of questionnaire were identified and the required improvements were made to satisfy the validity demands. Moreover, to assess the reliability of questionnaires 2, 3 and 4, the following steps have been taken:

✓ Precise study and identification of E-readiness assessment factors in countries and organizations.

✓ Interviewing experts of E-readiness concepts.

✓ Formulating a preliminary questionnaire and making the required improvements, consulting with management professors and advisors.

Table 2: Alpha coefficient for questionnaire 1

Model	Model dimensions	Technical infrastructures and security	Human resources	Legal frameworks	Policies, Strategies and Management	Alpha coefficient for the whole questionnaire
Chronbach's alpha coefficient	0.714	0.731	0.705	0.716	0.720	0.855

Table 3: Alpha coefficient for questionnaire 3

Model	Human resources	Policies, Strategies and Management readiness	Alpha coefficient for the whole questionnaire
Chronbach's alpha coefficient	0.821	0.732	0.734

Table 4: Alpha coefficient for questionnaire 4

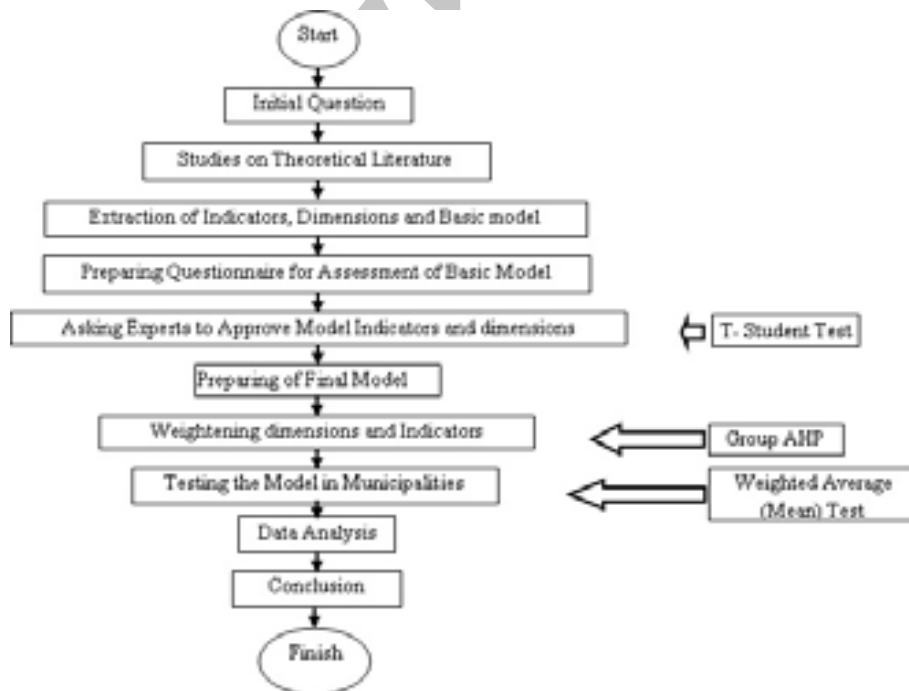| Model	Technical infrastructures and security	Legal frameworks	Policies, Strategies and Management	Alpha coefficient for the whole questionnaire
Chronbach's alpha coefficient	0.783	0.761	0.756	0.720

Figure 1: Research stages

Reliability of Measurement Tool

To assess the reliability of questionnaires 1, 3 and 4, Chronbach's alpha coefficient was calculated using SPSS 18 Software. The alpha coefficient was proved to be in tables 2, 3 and 4.

To make sure that judgments are rational, inconsistency indicator was used in questionnaire 2. Since the analysis method used for this questionnaire was Analytic Hierarchy Process(AHP), the inconsistency indicator achieved for questionnaire 2 was revealed to be 0.02 which shows a high level of rationality in judgments (II=0.02).

Research Stages

Generally, Electronic Readiness Assessment in Municipality includes the stages which are presented in figure 1.

Analysis of Assessment Models of Electronic Readiness and Developing a Preliminary Model

To develop the preliminary model of assessing electronic readiness of municipality, first, all organizational e-readiness assessment models were studied and the preliminary indicators were extracted. For this purpose, the 6 models named under research background, were used and the indicators were extracted. Next the frequency of indicators in model was determined based on their definitions. That is, two indicators with different names but same definitions were considered the same and the frequency considered for them was 2. Hence, all indicators with frequencies of 2 or more were selected as indicators of the preliminary model. This was selected as the frequency so that the indicators become agreeable to at least two model experts. In this way a preliminary frame work was developed with 4 dimension s and 32 indicators. Next, these indicators were categorized through using E-readiness assessment models as follows:

✓ All indicators pertaining to policies, programs, integrated management plans in the domain of IT and amount of budget allocated for planning, administration, …, were categorized under the dimension of Policies, Strategies and Management readiness. In "EMM@" model, this dimension is presented under the title of "strategy" and "organization & capabilities" and in Perm Model it is presented as

"commitment" and "Leadership" and in KPMG model it is presented as electronic strategy and performance management, in P313 model it is presented as IT policy and in Commercial Intelligence Maturity Model it is presented as Strategy Adaptation. Hence, this dimension is a one of the factors influential on E-readiness of Municipality.

✓ All indicators pertaining to using networks, access levels, etc. were categorized under the dimension of "Technical Infrastructure and Security" for a stronger and healthier communication. In "EMM@" model, this dimension is presented as Technology and "Personal Privacy and Security", in Perm Model, in the part of organizational factors, it is presented as "Technical Resources", in P313 model it is presented as "IT infrastructure", in KPMG model, it is presented as "architecture" and in Commercial Intelligence Maturity Model, it is presented as "Technical Readiness for Commercial Intelligence" and in MIT model it is presented under the title of "access".

✓ All indicators pertaining to trained human resources, human resources training and etc. were categorized under the dimension of "human resources readiness". This dimension is presented in "EMM@", PERM, P3I3 models and in so many other organizational readiness models under the title of cultural and Human Resources readiness.

✓ All indicators pertaining to laws and regulations are presented under the Dimension of legal framework. In "EMM@" Model, this Dimension is presented under the title of "Law", in PEER model it is presented as Government E-Readiness and in MIT it is presented as capability and in so many E-readiness models it is presented under the title of Law.

Testing and Correction of Preliminary Model of Assessing E-Readiness of Municipality

To test and correct the preliminary frame, questionnaire 1 was formulated and elites were asked to denote the degree of their agreement by choosing one of the alternatives provided to them based on Likert five Point Scale. Moreover, to collect indicators proposed by

experts, and not extracted from literature, and to complete and localize the first model, another alternative is added to this questionnaire, titled "Your Proposed Indicator". To do the survey, 12 IT elites were identified and the questionnaire was sent to them. 8 questionnaires were sent back out of the 12. One of elites only approved the model generally and hence was not included in the analysis. After collecting the results for selecting indicators and dimension influential in assessment of E-readiness of municipality according to elite's views, One Sample Student T test was performed for each indicator and dimension.

$H_0: \mu < 3$
$H_1: \mu \geq 3$

The test was administered with significance level of 0.05 ($\alpha=0.05$) and degree of freedom of 8, with the following hypotheses:

H_0= Mean of answers is lower than scale average
H_1= Mean of answers is higher than or equal with scale average

In this way, indicators found by elites as not proper for assessing E-readiness of municipality (indicators with mean of less than 3), or were found insignificance by them, were omitted.

After asking the opinions of elites and analyzing their answers, some indicators were added to the first model and some were omitted. Indicators added to the model were approvable for at least two elite. The results are inserted in table 5.

Weighing Model Indicators and Dimensions

After correction of the model, a questionnaire including corrected indicators was prepared and IT experts of municipality were asked to weigh indicators and dimensions. This was performed through group hierarchical analysis or group AHP.

Considering the number of experts, this stage was completed using Expert Choice 11 software and hence analysis stages are not specified here, though the results of weighted model dimensions are provided in figure 2.

The detailed results of weighing model indicators and dimensions are provided in table 6.

Assessment of Municipality Readiness

At this stage, all model indicators were assessed using a five-point Likert Scale. For this purpose, two questionnaires were prepared to be distributed between Municipality's managers and IT experts. These two questionnaires included questions based on model indicators. Questions marked with D2-1, D2-2, D2-3, D2-4, D4-2, D4-8 target municipality's managers and others target IT experts. Next using the formula of

$$E - Readiness = \sum_{i=1}^{n} W_i \times \mu_i$$

Equation 1: Formula for assessment of readiness

Where W_i= weight of each indicator and μ_i=mean of each indicator in the statistical society, Municipality's e-readiness in each dimension and finally in the whole was calculated. (Kirkman et al., 2001).

With regard to the size of the statistical society, in this research, descriptive statistics was used to test the research hypotheses. The test statistic used was weighted average method. Since, the value achieved for each question has been compared with figure 3 (average of coefficients allocated to alternatives provided under each question $(1+2+3+4+5)/5=3$)which has been set as comparison standard, hence, for each dimension, the assessment result must be bigger than the product of 3×weight of that dimension. Hence, with regard to research hypotheses it can be said that:

Main hypothesis: Municipality has electronic readiness to actualize Electronic Municipality.
H_0: Mean of responses is less than mean of scale (3): ($\mu<3$)
H_1: Mean of responses is bigger than or equal to mean of scale ($\mu=>3$)

Secondary hypothesis 1: Municipality has electronic readiness in technical infrastructures and security.
H_0: Mean of responses is smaller than 1.05 (3×0.35): ($\mu<1.05$)
H_1: Mean of responses is bigger than or equal to 1.05 ($\mu=>1.05$)

Secondary hypothesis 2: Municipality has electronic readiness in human resources affairs

H₀: Mean of responses is smaller than 0.453 (3×0.151): ($\mu<0.453$)

H₁: Mean of responses is bigger than 0.453 ($\mu=>0.453$)

Secondary hypothesis 3: Municipality has electronic readiness in legal frameworks

H₀: Mean of responses is smaller than 0.438 (3×0.146): ($\mu<438$)

H₁: Mean of responses is bigger than 0.438 ($\mu=>0.438$)

Secondary hypothesis 4: Municipality has electronic readiness regarding Policies, Strategies and Management.

H₀: Mean of responses is smaller than 1.059 (3×0.353): ($\mu<1.059$)

H₁: Mean of responses is bigger than 1.059 ($\mu=>1.059$)

The results of weighting dimensions and indicators and final calculations are provided in table 6.

Table 5: Results of survey of experts about the first model

Dimensions	Code	Questions	Results of Questionnaire 1			
			Mean	Observed T	Table T	H₀ status
Dimensions	D1	Readiness of technical infrastructures and security	4.62	25.27	1.86	rejected
	D2	Human resources readiness	4.75	29.02	1.86	rejected
	D3	Legal framework readiness	4.5	23.81	1.86	rejected
	D4	Policies, Strategies and Management readiness	4.5	23.81	1.86	rejected
Technical infrastructure and security	D1-1	Network and the band width	Added indicator based on elites opinion			
	D1-2	Internet and band width	4.62	25.27	1.86	rejected
	D1-3	Organization's being equipped with security equipment	4.75	29.02	1.86	rejected
	D1-4	Municipality's being equipped with required hardware	Added indicator based on elites opinion			
	D1-5	Organization's being equipped with general and specific software	4.75	29.02	1.86	rejected
	D1-6	Users' access to intranet and internet and files existing in network	4.75	29.02	1.86	rejected
	D1-7	Defining database and network access level for users	4.75	29.02	1.86	rejected
	D1-8	Updating and adapting mechanized systems with present needs of municipality	4.78	39	1.86	rejected
	D1-9	Rate of applying website	4.78	39	1.86	rejected
	D1-10	Rate website updating	Added indicator based on elites opinion			
	D1-11	Amount of data stored electronically	Added indicator based on elites opinion			
	D1-12	Rate regular database updating	4.75	29.02	1.86	rejected
Human Resources	D2-1	Degree of IT dependency in the jobs	4	21.16	1.86	rejected
	D2-2	Number of IT training courses held for managers and personnel	4.5	23.81	1.86	rejected
	D2-3	Administration of professional training courses on E-Municipality	4.37	23.91	1.86	rejected
	D2-4	Number of personnel who has IT related education	4.12	18.20	1.86	rejected
	D2-5	Holding virtual training courses for users	2.25	13.74	1.86	Accepted
Legal frameworks	D3-1	Formulation of new regulations or correction of current regulations to adapt to IT demands	4.5	23.81	1.86	rejected
	D3-2	Formulating laws for protecting E-customers of the municipality	4.37	16.63	1.86	rejected
	D3-3	Formulating laws for E-signature, coding and observing standards	4.5	23.81	1.86	rejected
	D3-4	Formulating laws to secure systems and networks	4.37	23.91	1.86	rejected
	D3-5	Formulating indispensable laws in municipality to develop IT	4.71	25.56	1.86	rejected
Policies, Strategies and Management Readiness	D4-1	Defining roles and responsibilities to actualize E-municipality	4.57	22.62	1.86	rejected
	D4-2	IT strategic plan and its alignment with municipality's major plan	4.5	23.81	1.86	rejected
	D4-3	Rate of electronic Government to Government communication	4.37	13.5	1.86	rejected
	D4-4	Rate of electronic government to business communication	4.25	13.56	1.86	rejected
	D4-5	Rate of electronic government to customer communication	4.37	13.5	1.86	rejected
	D4-6	Rate of electronic government to employee communication	4.25	13.56	1.86	rejected
	D4-7	Degree of integrity of various technical design, project control, administrative, and financial systems.	4.37	13.5	1.86	rejected
	D4-8	Rate of budget allocated to IT development and promotion and current activities	4.37	16.63	1.86	rejected
	D4-9	Emphasis on the importance of using IT by management	2.62	7	1.86	Accepted
	D4-10	Coordination among units involved in key processes of municipality using IT	4.87	17.1	1.86	rejected
	D4-11	Degree of municipality's commitment for actualizing E-municipality	2.71	7.5	1.86	Accepted
	D4-12	Municipality's support from E-municipality ideas and plans	4.42	14.89	1.86	rejected
	D4-13	Defining policies for users in IT	4.12	13.98	1.86	rejected
	D4-14	Degree of mechanization of municipality's process (such as implementation of automation program)	4	12.96	1.86	rejected

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- Readiness of Security and Technical Infrastructure 0.35
- Readiness of Human Resource 0.151
- Readiness of Legal Framework 0.146
- Policies, Strategies and Management 0.353

Figure 2: Weighted conceptual model of municipality e-readiness assessment

Table 6: Final conclusion based on questionnaires 2, 3 and 4

Dimensions	Question code	Experts' opinions					Mean	Indicator weight	Weighed value
		Very low	Low	Average	High	Very high			
Technical infrastructure & security	D1-1	0	0	12	8	0	3.4	0.022	0.0748
	D1-2	0	5	11	4	0	2.95	0.021	0.061
	D1-3	0	6	13	1	0	2.75	0.024	0.061
	D1-4	0	3	14	3	0	3	0.02	0.06
	D1-5	0	0	11	9	0	3.45	0.02	0.069
	D1-6	0	1	11	8	0	3.35	0.019	0.063
	D1-7	7	12	1	0	0	1.7	0.016	0.027
	D1-8	8	11	1	0	0	1.65	0.037	0.061
	D1-9	0	6	14	0	0	2.7	0.024	0.064
	D1-10	1	11	8	0	0	2.35	0.033	0.077
	D1-11	0	3	11	6	0	3.15	0.062	0.192
	D1-12	0	1	13	6	0	3.25	0.051	0.165
	Total weighted values								0.979
Human resources	D2-1	2	17	16	0	0	2.4	0.019	0.045
	D2-2	0	19	16	0	0	2.457	0.05	0.122
	D2-3	13	17	0	0	0	1.485	0.028	0.041
	D2-4	11	22	2	0	0	1.742	0.054	0.094
	Total weighted values								0.302
Legal frameworks	D3-1	11	8	1		0	1.5	0.032	0.048
	D3-2	11	5	0	0	0	1.25	0.029	0.036
	D3-3	15	5	0	0	0	1.25	0.018	0.022
	D3-4	2	10	8	0	0	2.3	0.042	0.096
	D3-5	9	11	0	0	0	1.6	0.028	0.044
	Total weighted values								0.246
Policies, Strategies and Management	D4-1	0	5	22	8	0	3.085	0.013	0.127
	D4-2	0	0	0	0	0	0	0.029	0
	D4-3	13	7	0	0	0	1.35	0.017	0.022
	D4-4	13	7	0	0	0	1.35	0.021	0.028
	D4-5	12	8	0	0	0	1.4	0.021	0.029
	D4-6	14	6	0	0	0	1.3	0.018	0.023
	D4-7	0	3	12	5	0	3.1	0.052	0.161
	D4-8	0	4	12	4	0	2.6	0.023	0.059
	D4-10	0	10	10	0	0	2.8	0.053	0.132
	D4-12	2	11	7	0	0	1.4	0.018	0.04
	D4-13	12	8	0	0	0	2.25	0.017	0.023
	D4-14	0	6	12	2	0	2.5	0.051	0.142
	Total weighted values								0.786

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RESEARCH RESULTS

Based on the achieved results, E-readiness of municipality regarding each dimension of the model and its total readiness are as follow:

- ✓ Total E-readiness of municipality: 2.313 (out of 5)
- ✓ Dimension of technical infrastructures and security: 0.979 (out of 5)
- ✓ Dimension of human resources: 0.302 (out of 5)
- ✓ Dimension of legal frameworks: 0.246 (out of 5)
- ✓ Dimension of policies, strategies and management readiness: 0.786 (out of 5)

Testing of hypotheses yielded the results in table 7.

RESULT OF ANALYSIS

Based on the results of table 7, Municipality does not have e-readiness in any of the model dimensions. As it is evident from the diagram, Municipality has low level of e-readiness in all four dimensions of the model. The results are presented in figure 3.

According to findings, e-readiness of municipality in the dimension of technical infrastructures & security is presented in figures 4, 5, 6 and 7.

Table 7: Results of hypotheses testing

Dimension code	Dimension title	Weighted value	H_0 value	Test result
D1	Technical infrastructures & security	0.979	1.05	H_0 Accepted
D2	Human resources	0.302	0.453	H_0 Accepted
D3	Legal frameworks	0.246	0.438	H_0 Accepted
D4	Policies, Strategies and management readiness	0.786	1.059	H_0 Accepted
D5	Total value of readiness (out of 5)	2.313	3	H_0 Accepted
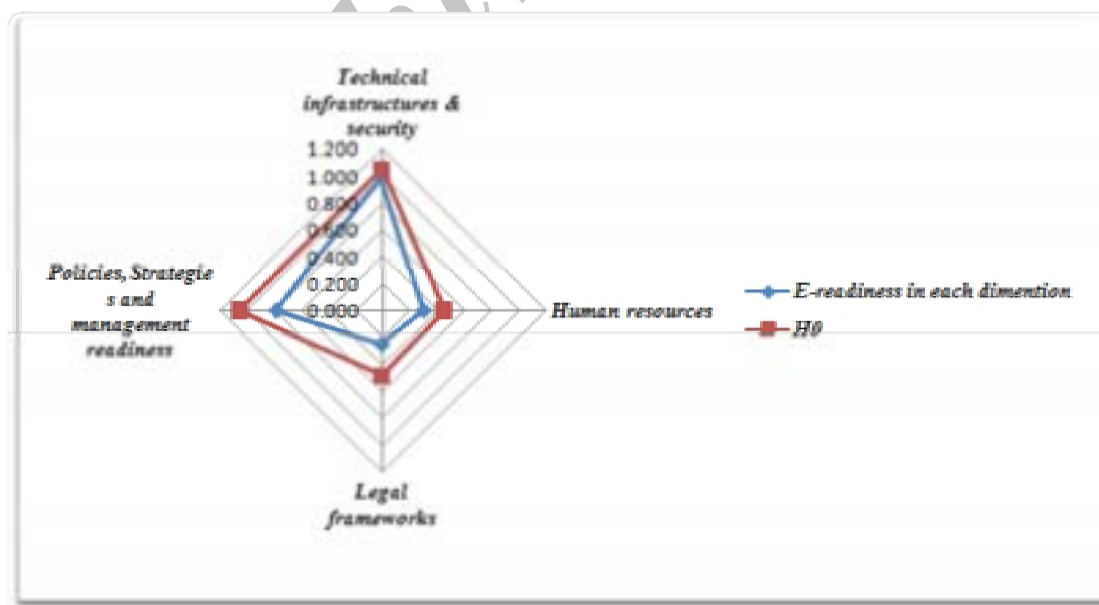
Figure 3: E-readiness of municipality in model dimensions
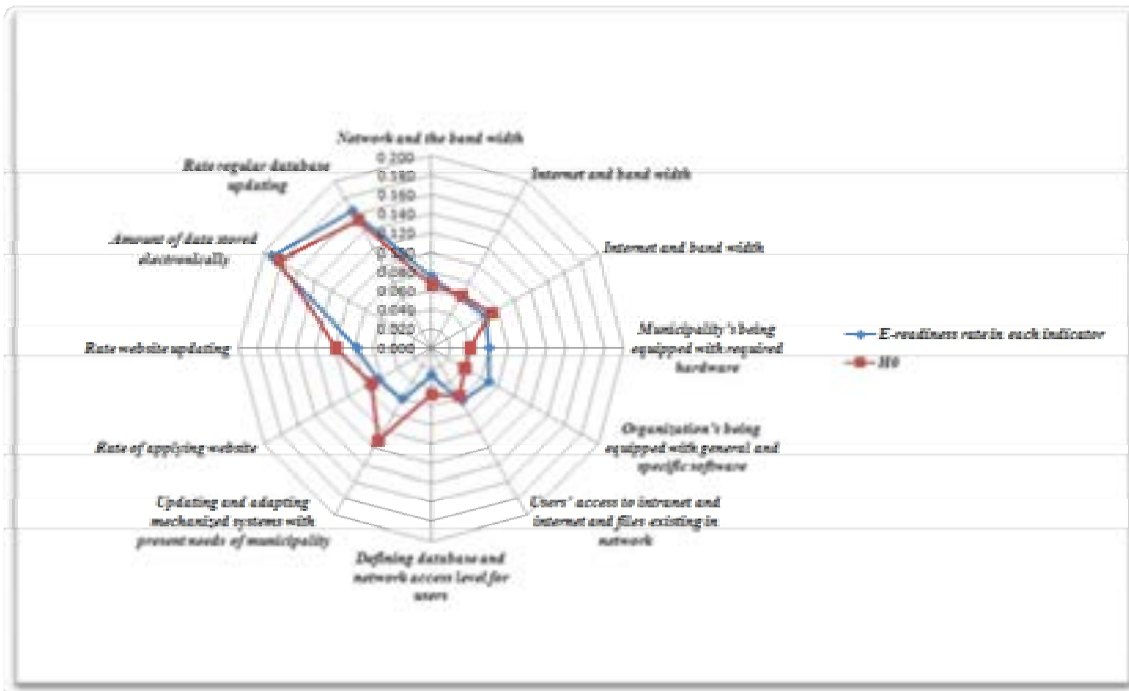
Figure 4: E-readiness of municipality in dimention of security and technical infrastructure
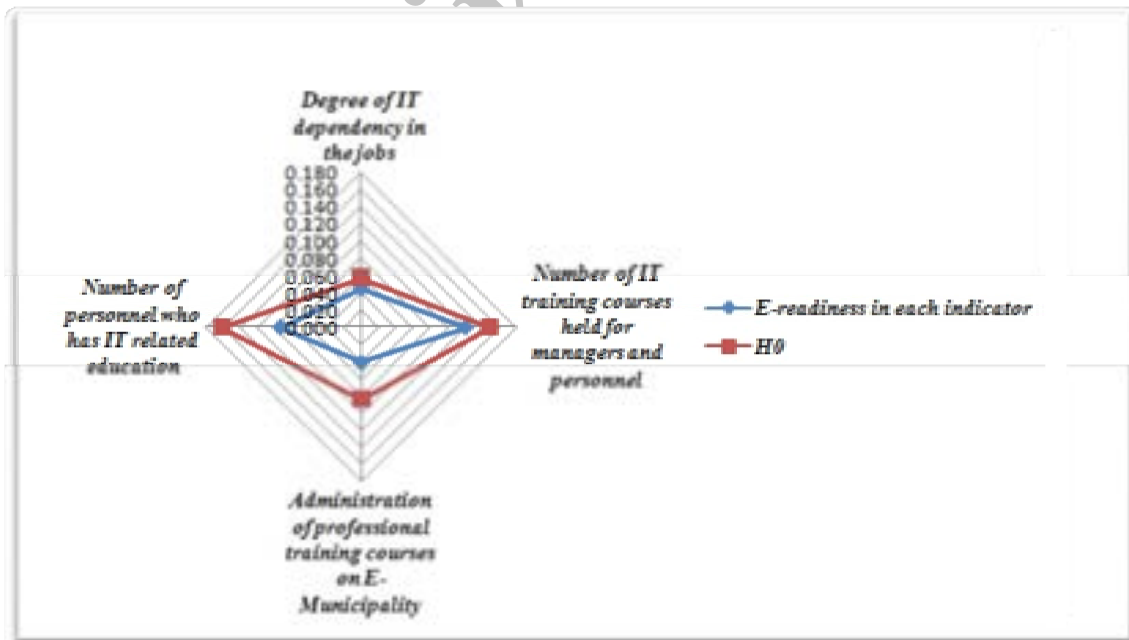

Figure 5: E-readiness of municipality in the dimention of human resources
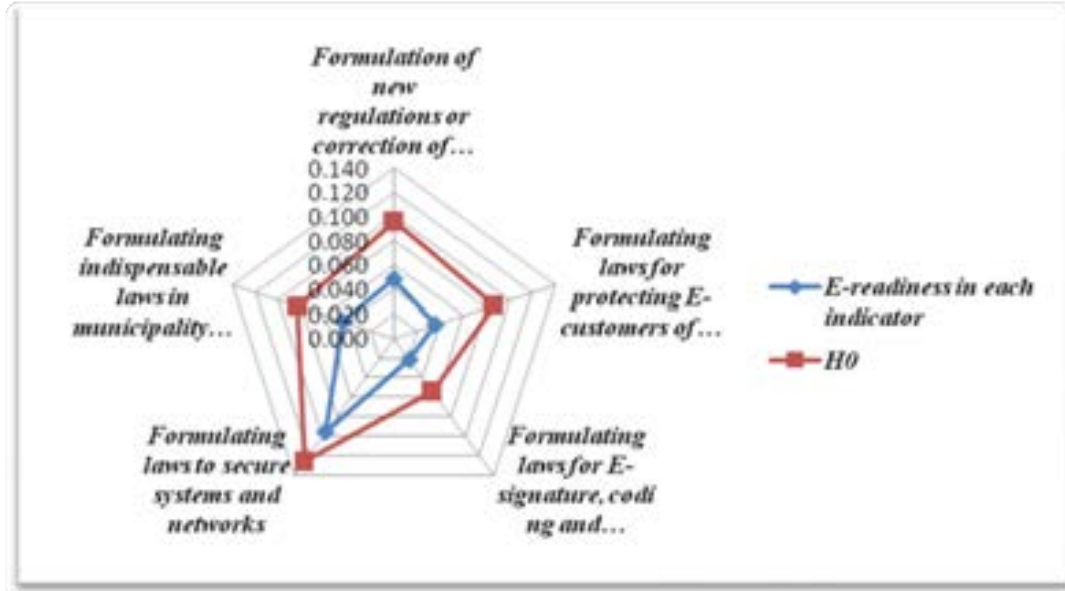
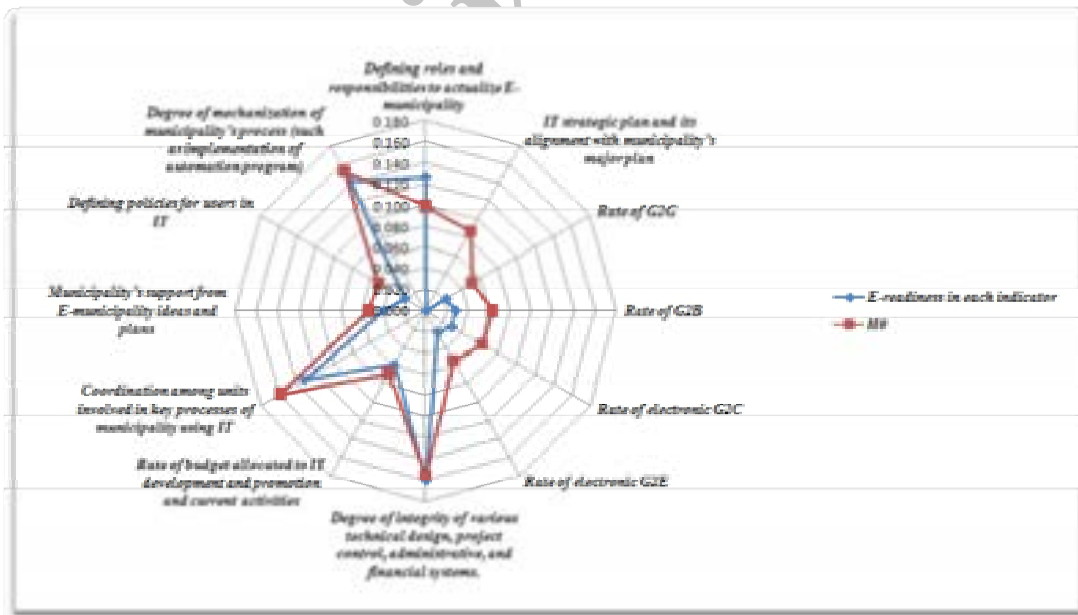**Figure 6: E-readiness of municipality in the dimension of legal frameworks**

Figure 7: E-readiness of municipality in the dimension of policies, strategies and management

CONCLUSION AND RECOMMENDATIONS

Assessment of the degree of e-readiness of municipality can provide valuable information for managers of municipality, on allocation of resources, policy making and planning. Assessment and measurement of e-readiness of municipality allows managers to find a proper understanding of the status of IT in municipality and allow them plan to improve it considering the weight of each indicator. As a result of this essay, a model was presented to assess e-readiness of municipality that can assess also e-readiness of other municipalities across the country. Moreover, since this model has benefited from organizational models, is highly flexible in adjusting measurement indicators. Moreover, taking the study results into account, the following suggestions have been provided to improve IT status: Developing of net lines in different parts of municipality to increase access to network based on organizational structure; Allowing system users to have access to network and to the files existing in it; Improving and updating computer based systems of municipality regularly; converting existing data into e-data to decrease maintenance costs; developing a comprehensive databank; developing an organizational culture so that organizational culture is used more especially for having interaction with beneficiaries. These are some of the suggestions that can be pointed out regarding the dimension of technical infrastructures and security.

Planning and holding special training courses on "e-municipality" for personnel and managers, with the cooperation of Municipality's Management of Educational Affairs, revising human resources unit and planning for recruitment of skillful personnel who have received IT related education, are some of the suggestions that can be categorized under the dimension of human resources readiness.

Sanctioning required laws and acting in coordination with superior systems like Radio Communication Organization and IT Management of Governor General's Office, sanctioning laws to protect e-customers' rights, and formulation of laws as to e-signature, coding, and observance of standards, and formulation of in-house regulations such as making it compulsory for employees and managers to use computer based systems and computers in general are suggestions that can be helpful with regard to legal frameworks.

Formulation of IT strategic program based on the goals and perspectives specified in Municipality's Strategic Program, strengthening communication infrastructures and negotiating with public institutions, making incentive policies regarding businesses, citizens and personnel to motivate them for using e-communication and making policies regarding Tele-workers are suggestions that are helpful in regard with policies, strategies and management readiness.

This research was conducted with the purpose of assessing e-readiness of municipality and for the purpose of this research; a model was prepared with 33 indicators based on organizational e-readiness assessment models. This research has been conducted through studying credible organizational e-readiness assessment models and through extracting their indicators and through asking the opinions of experts in universities and higher education centers. The designed model includes 4 dimensions of "Technical Infrastructure and Security", "Human Resources Readiness", "Legal Frameworks", "Policies, Strategies and Management Readiness" and can clarify the weaknesses and strengths of municipality regarding IT. Moreover, this model presents strong tools of analysis that can guide strategies of investment in the domain of IT. This model can be used to assess e-readiness of municipalities across the country in having access to communication and IT technology and using it and to analyze the digital gap between them.

ACKNOWLEDGEMENT

Notes

Note 1: CSPP: Computer System Policy Project
Note 2: APEC: Asian Pacific Economic Cooperation
Note 3: UNECO: United Nation Educational, Scientific and Cultural Organization
Note 4: G8 Summit
Note 5: Gross Domestic Product

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