



Identification and Ranking E-commerce Infrastructure E-Readiness Indicators

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Abstract

In this study, have been tried to identification and prioritizing infrastructure e-readiness factors by using a descriptive analytical method. There are several models to assess the readiness of e-commerce infrastructure that consider difference set of variables for evaluating indicators criterion. Since there is no standards and specification models for e-readiness infrastructure assessment in Iran, affecting variables on e-commerce identified by studying various models and using interviews with 70 of professionals and experts in the field of Information Technology and variables that had little impact omitted. Till a model with 34 variables in four dimensions as: technological, economic, political and social specific for Iran e-commerce infrastructure readiness is achieved. Questionnaire was prepared by using a Likert spectrum then number of experts and specialists in management and behavioral sciences confirmed content validity of questionnaire and by the method of calculate reliability, Cronbach's alpha coefficient came 0.83 which indicated the reliability of questionnaire. Also, by analyzing and processing the results of the questionnaire that was performed under the Friedman analysis of SPSS software, variables and 4 dimensions of them in order of importance and influence have been prioritized that showed technological dimension and information infrastructure and communication variable has the greatest impact on e-commerce infrastructure readiness.

Keywords: E-Commerce Infrastructure Readiness, Assessment Model for E-Readiness, Friedman Analysis, Ranking, E-commerce Indicators

Introduction

By establishment and increasing spread of the Internet, could see new words, new ideas and innovative forms of Internet-related activities in the field of international trade. Concepts such as E-government, E-commerce, Extranet, Intranet etc are such forms of international business activity that has improved with the expansion of globalization. The importance consequence of globalization on the economies is development of e-commerce. The market of electronic, electronic data interchange and e-trade are components of e-commerce, which demonstrate the close relationship between ICT management with market and management processes. Due to the rapid growth of electronic commerce in the developed countries and competitive advantages that forces developing countries to immediately rethink on their business strategies and policies. To achieve the proper perspective regarding the current situation and the problems of e-commerce in developed and developing countries requires e-commerce accurately checked and analyzing its components, elements, indicators and factors that affecting on it. Should be assessed the inputs, process, outcome and efficiency of the e-business to ensure the achievement of desired goals.

E-commerce offers a variety of services and review and evaluate all of these services is very hard and requires a long period of time also coordination is more hard. Therefore, this study examines and identifies the variables of e-commerce in the view of digital economy, social, law and public policy and

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communications and technology infrastructure [1] means to eventually reach the conclusion that, what variables and with what priority impact on e-commerce infrastructure readiness. So the overall aim of this study was to identify the components of e-commerce services infrastructure e-readiness and response to this question that readiness of e-commerce service infrastructure is most affected by which variables, which extent and with what priority.

Hypothesis and Research Background

E-commerce has been one of the most widely used and most popular fields of trade and economic over the years which was developed every day in both the scope and the extent of it. This terminology and its concepts of evidence according to its two components, electronic and business, involves a wide range of topics and issues. E-commerce (EC) with its techniques and models is one of the phenomena of Information and Telecommunication Technology (ICT), which the information is its main yeast[2]. Today information in societies leads to complex relationships between its members in the areas of economic, cultural, political, social, etc. Based on views of Mr. Alvin Toffler's book The Third Wave and Peter Druker in industrial society book this age is called Information Age which have two main axes, technology and Market. Because the greatest impact of EC is on, reducing transaction costs for customers and vendors, increasing management efficiency, reducing transaction times, establishing close relationships with the business customers and increasing loyalty and trust between the customers[3].

As a newly entered country to the field of commerce and e-banking, Iran has a long way to go to achieve an acceptable level. For the development of e-commerce in the country, entry into global markets and membership in organizations such as WTO and have an efficient banking system are essential requirements. Therefore, the use of information and communication technology is important for development of electronic banking in the banking system [4]. Development of e-banking requires a certain economic and social infrastructure. Importance of this infrastructure include: communication and telecommunication networks, secure information sharing, infrastructure, legal appropriate and cultural readiness of public & enterprises to adopt and use electronic banking services [5]. In most contexts, meanings of e-readiness indicators and indexes that are used in this study are equivalent to the requirements or the basic concepts [6]. There are different models to assess e-readiness such as CSPP, CID, APEC, MOSAIC, EIU and ITU. These have offer different ways & indicators to measure e-readiness. E-readiness assessment models cause to more accurate planning to enter into the era of information and providing a infrastructure to monitor the performance of executive agencies[7]. For example, since 2000, every year, IBM Institute, provides e-readiness ranking of the world countries according to the EIU model[8]. In this context, researchers and companies have offered a set of factors that influence e-readiness in the form of models and assess the e-readiness of countries and rank them by these indicators. different models based on several factors is considered in e-Commerce infrastructure readiness analyze, these models and the most important affecting parameters gathered in table below[9].

Table 1.e-readiness models by separated variables [9]

Diminutions		Telecommunications infrastructure & Technology							Society				Digital Economy				Legal & Public Policies					
Factors methods	Suitable telecommunication networks	Security communication	IT infrastructures	services support	internet availability	Speed and quality of internet connection	ISPs	Skilled work force	Cultural readiness	Satisfaction and trust	Online users	education	Economical environment	ICT competition	Costs and prices	consumers	growth GDP	E-commerce support	Digital signature	Privacy security	Suitable law implementations	E-government
	*			*	*	*	*	*			*	*	*	*	*	*	*	*		*	*	
					*				*				*								*	
	*				*	*						*	*								*	*
	*		*						*				*	*							*	*



World economy seminar	*																			*		
(BOLERO2[10]	*	*							*											*	*	*
Frame work of assessment of E-readiness					*	*	*			*				*							*	*
(USAID):					*							*				*					*	*
Sweden international agency for developments	*											*										
WITSA regarding E-readiness								*		*			*		*	*					*	
Mosaic	*				*			*				*										
CIDCM					*				*			*	*	*							*	*
worldwide technological factors : Metric-net	*							*				*	*	*								
McConnell International business risks	*				*			*				*	*	*	*				*	*	*	
knowledge assessment matrix :KAM	*							*				*	*									
IDC	*		*		*				*													
Pyramidal research of e-readiness	30%				10 %				5 %				20 %			20 %					15 %	
APEC assessment of E-readiness	*				*	*		*		*		*	*	*							*	
Measuring tools	*		*		*							*	*	*							*	
Network reachable assessment	*		*	*	*	*																
CPSS Guidance	*		*	*	*	*							*							*	*	
Readiness Index - Determinants	*		*					*				*	*								*	*
Seyed javad & Seghtchi[11]	*							*													*	
Center for International Development at Harvard University[12]					*				*			*	*								*	
Economist Intelligence Unit and Pyramid Research	25%								15 %				20 %			20 %		5 %			15 %	
EIU e-readiness rankings [8]	30%				10 %				5 %				20 %			20 %					15 %	
Mosaic Group	*				*																	
Abundance	21	1	6	6	15	5	1	9	10	2	1	11	19	6	4	6	1	2	1	4	20	6

The e-readiness assessment methodologies are some of the methods of analyzing e-readiness have been shown in the table below.

Table 2. Methods of analyzing E-readiness [13]

Model	Questioner	Properly model	Successful experiences	Event analyses and last works
CSPP	*	*		
CID	*	*		
APEC	*	*		
WITSA	*	*		
McConnell		*	*	*
Crenshaw & Robinson		*		
CIDCM		*	*	*
Mosaic	*	*	*	*
USAID		*		*



Methodology

Since e-commerce infrastructure readiness comes from 4 different Dimensions this paper looks on the factors influencing e-commerce infrastructure readiness by interviews with experts in this field and using a library approach study to analyze past events and records. As well as some statistics on variables that reflect Successful experiences in this field is collected and discussed by evidence way. The information gathered by the questionnaire stored in Excel2013 and were analyzed by using SPSS (v.19) Friedman analyze. Thus indicated frequency scores and statistics from prioritization obtained some results, which analyzed. The presented study is a basic - applied research. Because the researcher did this study to improve their understanding of the relevant research issues that normally occur at organizations and on the other hand aims to use research findings to improve the situation of under study area. In order to identify the variables and data collection and information which used in the present study, by 70 experts directors of interaction with e-commerce organizations that have the educational background and work experiences, particularly in the areas of community, the digital economy, law and public policy and communications[14] infrastructure and e-commerce technologies and the faculty members of universities and explore papers in e-commerce as well as books, dissertations and several papers were used. Population size is all organizations can engage in e-commerce and individuals associated with these companies and organizations in the considered areas. After the interviews and publish questionnaires among 20 experts from the field of e-commerce and the estimated variance of 95% of the original sample,

the sample size was calculated using the following formula: $n = \frac{Z_{\alpha}^2 \times S^2}{d^2}$ According to calculations, 70 as the sample for the study was estimated that was selected by snowball sampling survey with a random sample of experts in the field of information technology and e-commerce, especially in the four dimensions of technological, political, economic, social in East Azerbaijan eparchy. The general characteristics of the sample formed as 17 (24%) were female and 53 (76%) male thus 23 are bachelor's degrees, 15 master's and 32 PHDs. In total 9 people was under 30 years old, 36 people between 30-40 years old, 16 people between 40-50 years old and 9 people were older than 50 years old. To collect the required data in the study and describe the foundations of the model, the library collection methods including a review of relevant literature through reference books, theses and papers, observation, statistical records were used. The method used in this research is descriptive and analytical method which Friedman analysis technique was used for analyzing and presenting the results. So after literature review of previous research and interviews with experts and a comprehensive study, a group of effective variables can be extracted. Then the model has been studied with managers and experts in e-commerce-related organizations and their comments will be taken through a questionnaire to prioritize Friedman analysis performed on variables. Based on theory of Churchill (1979) to create a scale when parts of study were identified must set of items associated with each of the following occur [15] By studying the same texts, detailed interviews and discussions with professors and advisors and specialists and managers, according to the study, intended items to measure each dimension identified, analyzed, and finally a multi-dimensional screening, led to the approved validity by the scientific and clinical experts, was developed. The questionnaire was developed from the literature and expert opinion and were used native and in accordance with the general atmosphere of the study. The questionnaire used in the study generally consists of two general and expertise questions. The first set of questions was about respondents' personal characteristics such as gender, age, education and work experience that has discussed earlier. The second set of questionnaires that are specialized questions are designed to test the study hypothesis. For quantity rating and worth specific questions, Likert scale include a rating from one to five, is used. To determine content validity, some questionnaires were given to the number of scholars and teachers, management and behavioral sciences and their opinions about the questions and hypotheses evaluation, polled to confirm validity. It is also reliability capability calculating way, Cronbach's alpha by calculating coefficient of variance of test questions and whole variance, with using the formula, alpha coefficient was calculated 0.83 which shows its reliability.



Data Analysis and Findings

In this section, obtained by the literature review, interviews with experts, officials and documents data are analyzing. All variables related to e-commerce obtained past studies, statistics, interview with experts in the field, results in the recorded books and articles included in the interview questions then the key variables influencing in ecommerce have been chosen by the opinions of experts and the remaining cases were excluded. Also the variables that had a greater impact were selected and accordingly more focus and more studies have been done on these variables and developed till effective and appropriate indicators identified as a model. It should be noted that variables such as accidents, international conditions and explosion policies has not been considered in this study. The model developed in this study is a preliminary attempt to analyze the affecting factors on e-commerce infrastructure readiness. After defining the problem considered in this study, a comprehensive study conducted on literature and previous research. Based on these studies, important variables identified and terms in four dimensions showed. Affecting factors on e-commerce readiness include four dimensions technological, political, economic & social which also caused a number of each of following table variables.

Table 3. E-readiness infrastructure variables

Confidence and satisfaction with e-services	social	Suitable telecommunication networks	technological
Fear of information theft		Companies providing electronic services	
Skilled work force		Security In communication	
Cultural readiness		IT infrastructures	
Trust and satisfaction		services support	
Online users		Access network such as the Internet	
Education		Speed and quality of internet connection	
Willingness to use again		Ability to issue digital signatures	
Digital signature	political	Economical environment	economic
Privacy security		ICT competition	
Appropriate legislation and legal provisions		Consumers	
E-government		Costs and expenses	
E- commerce support		growth GDP	
Political barriers such sanctions		The number of e-commerce services users company	
Electronic banking boom		Finance and Investment	
Legal support in the areas of e-commerce		Demand and Digital Signatures	
Governmental organizations that are authenticated with digital signatures		Unwillingness of financial transparency	

The questionnaire form was created with the theme of model variables and the impact of have been identified variables, based on questionnaires taken from experts which prepared by Likert scale, Friedman analysis was performed with using SPSS software, below is the results table that include the mean value, standard deviation, minimum and maximum bounds percentage.



Table 4. SPSS output for Friedman analysis

Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum	Percentiles		
						25th	50th (Median)	75 th
Suitable telecommunication networks	70	4.56	.644	3	5	4.00	5.00	5.00
Companies providing electronic services	70	3.64	.964	0	5	3.00	4.00	4.00
Security In communication	70	4.38	.855	2	5	4.00	5.00	5.00
IT infrastructures	70	4.28	.970	0	5	4.00	4.50	5.00
services support	70	4.00	.808	2	5	4.00	4.00	5.00
Access network such as the Internet	70	4.26	.876	2	5	4.00	4.50	5.00
Speed and quality of internet connection	70	4.10	.909	2	5	3.75	4.00	5.00
Ability to issue digital signatures	70	3.62	.923	1	5	3.00	4.00	4.00
Economical environment	70	3.80	1.325	0	5	4.00	4.00	5.00
ICT competition	70	3.86	1.069	0	5	3.00	4.00	5.00
Consumers	70	3.62	.830	2	5	3.00	4.00	4.00
Costs and expenses	70	3.62	.901	2	5	3.00	4.00	4.00
growth GDP	70	3.76	.916	0	5	3.00	4.00	4.00
The number of e-commerce services users company	70	3.84	1.017	0	5	3.00	4.00	4.25
Finance and Investment	70	3.94	.956	1	5	3.00	4.00	5.00
Demand and Digital Signatures	70	3.54	.952	1	5	3.00	4.00	4.00
Unwillingness of financial transparency	70	3.80	.833	2	5	3.00	4.00	4.00
Confidence and satisfaction with e-services	70	4.20	1.010	2	5	3.00	5.00	5.00
Fear of information theft	70	4.02	.915	2	5	4.00	4.00	5.00
Skilled work force	70	3.74	1.103	1	5	3.00	4.00	5.00
Cultural readiness	70	4.18	.896	2	5	4.00	4.00	5.00
Trust and satisfaction	70	4.12	.872	2	5	4.00	4.00	5.00
Online users	70	3.70	.886	2	5	3.00	4.00	4.00
Education	70	3.84	.955	1	5	3.00	4.00	4.25
Willingness to use again	70	3.32	.999	1	5	3.00	3.00	4.00
Digital signature	70	3.70	.931	1	5	3.00	4.00	4.00
Privacy security	70	3.80	1.107	0	5	3.00	4.00	5.00
Appropriate legislation and legal provisions	70	4.44	.951	0	5	4.00	5.00	5.00
E-government	70	4.06	1.018	0	5	4.00	4.00	5.00
E- commerce support	70	4.34	.939	2	5	4.00	5.00	5.00
Political barriers such sanctions	70	3.90	.839	2	5	3.00	4.00	4.25
Electronic banking boom	70	4.28	.701	2	5	4.00	4.00	5.00
Legal support in the areas of e-commerce	70	3.98	.958	2	5	4.00	4.00	5.00
Governmental organizations that are authenticated with digital signatures	70	3.52	1.129	1	5	3.00	4.00	4.00

The scoring based on Friedman analysis obtained for each of the variables. Radar chart shows total and mean scores in each of the 4 Dimensions, that each of them is a set of variables result.

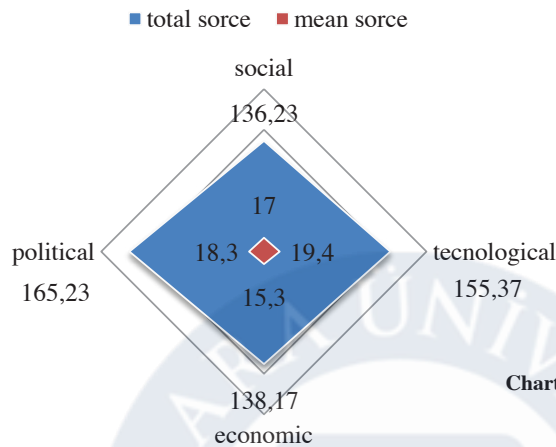


Chart 1 . Total and mean scores for each dimension

There is all variables rank based on Friedman analysis in the following table.

Table 5. Variables mean rank SPSS output

Rank		Mean Rank	Rank		Mean Rank
1	Suitable telecommunication networks	24.33	18	ICT competition	17.06
2	Appropriate legislation and legal provisions	23.13	19	Political barriers such sanctions	16.97
3	Security In communication	22.52	20	Education	16.35
4	Privacy security	22.34	21	Legal support in the areas of e-commerce	16.16
5	IT infrastructures	21.84	22	The number of e-commerce services users company	16.15
6	Access network such as the Internet	21.21	23	Skilled work force	15.70
7	Electronic banking boom	21.03	24	growth GDP	15.47
8	Trust and satisfaction	20.86	25	Unwillingness of financial transparency	15.10
9	Cultural readiness	19.91	26	Digital signature reliability	14.88
10	Confidence and satisfaction with e-services	19.88	27	Online users	14.44
11	Speed and quality of internet connection	19.40	28	Companies providing electronic services	14.21
12	E-government	19.32	29	Ability to issue digital signatures	14.15
13	Fear of information theft	18.51	30	Costs and expenses	13.58
14	E- commerce support	18.09	31	Consumers	13.35
15	services support	17.71	32	Governmental organizations that are authenticated with digital signatures	13.31
16	Finance and Investment	17.33	33	Demand and use Digital Signatures	12.83
17	Economical environment	17.30	34	Willingness to use again	10.58

Conclusions

The conclusions in this study include literature review and interviews with experts in the field of e-commerce results, leading to identify e-Commerce infrastructure variables influencing e-readiness, and questionnaires analysis. Research questions have been answered in the conclusion. It also proposed offers to researchers and managers in the area of e-commerce. Parameters table that obtained with study old documents and interview with experts, can be used as a flagship model for Iran. Also, based on what is



observed in the output analysis, preference of variables are shown in table , starts with 'communications networks' variable with the highest priority to lowest priority 'interest to use electronic services again' variable. The highest priority in dimensions is for technological dimension then the political and social have while the economic dimension has the lowest priority as shown on the chart1. Therefore, the technological dimension continuous improvement process, which has the highest priority in Iran, would be a direct positive impact on Iran's e-commerce infrastructure readiness. Data security and privacy variables have high priority that their improvement can be used to reduce the impact of negative variables such as fear of information theft. Also, due to the weakness of e-commerce readiness in our country, in dire need to government's financial support from information technology and government's interest to use information technology that must be associated with electronic government. In this case, both investment promote to cover economical dimension and technological dimension will be provided and by law state support, clear and precise rules in the field of e-commerce will be developed that could be paving way for electronic commerce. It should be noted that another negative variable that impact on model's variables are political obstacles like sanctions, by overcoming them can be produced ecommerce infrastructure readiness growth path.

It is recommended that future researchers develop study model by expanding the system boundaries and taking more exogenous variables in the model, developing this model through input other relevant institutions such as organizations that are active in this field and customize the study model at companies with micro- looked and check system behavior under different scenarios to increase the study scope. It should be noted that the present study has some limitations as any other scientific research. To make the model behavior correct, all the model variables must expressed but due to time and information constraints, the affective variables have shown in this study, on the other hand, variables obtained through interviews with experts that may be have not answered carefully due to interview less time and only with 70 people of entire community of specialists in this field were interviewed and the experts in each of four districts can't comment on interdisciplinary issues, this causes an error in discussions which made work very difficult.

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