Full Length Research Paper

CSFs of e-commerce admission in small and medium size enterprises (SMEs)

Mohammad Reza Abbasi[1], Mohammad Ali Sarlak[1], Ali Ghorbani[2]* and Hossein Abbaasi Esfanjani[1]

[1]Payame Noor University, Lashkarak highway, Nakhl street, Tehran, 19569, Iran.
[2] Islamic Azad University, Bonab branch, Imam St, Bonab, East Azerbaijan, Iran.

Indeed, leaders in e-commerce have achieved a 41% improvement in cycle times and 10% reductions in staff costs, whereas they have increased returns on investment to about 13-fold. Regarding these advantages and opportunities, it seems that identifying success and failure factors involved in e-commerce implementation is necessary. So, the SMEs could take faster and easier actions in developing e-commerce concerning these factors. This paper attempts to review the critical success factors (CSFs) that affect e-commerce adoption in Iranian SMEs and determine the importance of each factor using statistical techniques. In this regard, six hypotheses were defined on the premises of the relationship between the independent variables of the modified TAM model and e- commerce adoption using correlation tests. To perform this research, a number of SMEs implementing e-commerce in Iran were selected as samples. The information was collected from officials of the information technology units of enterprises. The results show that variables of perceived usefulness, perceived ease of use, innovative character of the enterprise, information technology maturity and subjective norms have a significant positive impact on adoption of e-commerce in SMEs. However, the industry competitive environment characteristics were found to have an insignificant correlation on the dependent variable. By ranking the independent variables, the perceived usefulness was identified as an important factor affecting the adoption of e-commerce in SMEs, while the variables of perceived ease of use, subjective norms, information technology maturity and innovative character of the enterprise, follow as the next ranks. In conclusion, some suggestions were given to the involved officials and industrial managers to facilitate implementation and establishment of e-commerce in SMEs.

Key words: Electronic commerce (e-commerce), technology acceptance model (TAM), Yazd province, mature stages.

INTRODUCTION

Small and medium size enterprises (SMEs) play a basic role in the improvement and promotion of economic indices as a major economic sector of any country and therefore, adopting creative and modern methods and tools for performing business processes and affairs play an important role in the success of any organization. Fathian et al. (2008) frequently noted the potential share of e-commerce for the SMEs, in that e-commerce could be very attractive due to the innovative characteristics of SMEs. Regarding the many advantages of e-commerce over traditional businesses, this exceptional opportunity has been provided for SMEs to act in a global extent like the large size enterprise, while their transaction costs are much less than before. Therefore, in the near future, corporations and industries that incorporate e-commerce systems in their organizations through a proper and strategic planning will get the competitive ability in a global

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*Corresponding author. E-mail: ghorbani@phd.pnu.ac.ir. Tel: +98 21 22 80 48 42. Fax: +98 21 22 80 84 94.

Closed ────────►Initial ─────────►Planed─────────► Realized────────► Institutionalized──────────► Optimizing

(Mature stages)

Figure 1. Exporters' e-commerce mature model for goods and services export development (reference: Aghazadeh and Esfidani, 2006).
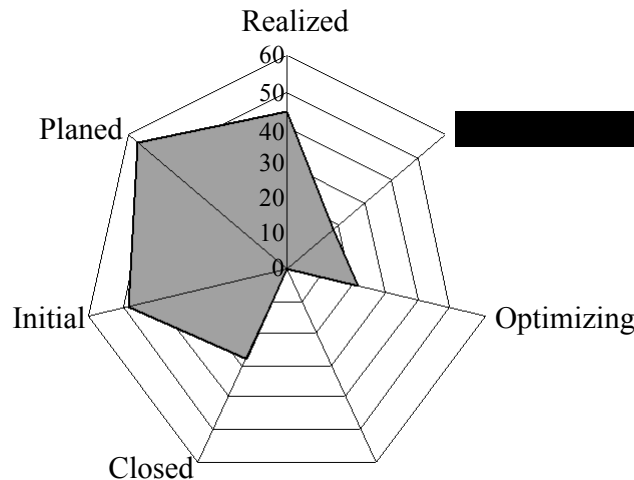

Figure 2. Developed stages among sextet stages of e-commerce mature (Source: Nouri, 2007).

global extent. In order to perform their transactions with much lower costs in an international extent, those companies look for companies that implement e-commerce systems. Essentially, the traditional method of commerce has no economic justification for those companies anymore due to its high expenses and restrictions (Sanayei, 2002).

Indeed, the leaders in e-commerce have achieved a 41% improvement in cycle times, 10% reductions in staff costs and increased returns on investment of up to 13-fold (Kearney, 2002). Regarding these advantages and opportunities, it seems that identifying the success and failure factors involved in e-commerce implementation are necessary. So, the SMEs could take faster and easier actions in developing e-commerce concerning those factors. Several studies have been done on the use of e-commerce in enterprises considering significant sets of models and patterns in performing e-commerce and as such, they have taken a matured level of the Iranian enterprises. Farrokhzad (2004), after studying over 30 e-commerce models, expressed different stages for developing e-commerce by Iranian exporters (Figure 1). As such, studies done by Aghazadeh and Esfidani (2006) and Noori (2007) support this model.

These researches measured the rate of e- commerce growth in Iran exporting industrial companies. As shown in Figure 2, the highest growth of the companies is at the "primary presence" stage. Due to data collection difficulties,

most of the previous studies in the field of e-commerce adoption in Iran have not focused on the existing enterprises and as a result, these studies have been confined to experts, specialists and university professors. A great gap between these two groups in Iran (experts and companies) have hindered the discovery of the real effective factors of e-commerce adoption. It seems that application of other researches in Iran requires more adjustments (Sarlak et al., 2009).

Therefore, considering the these cases, this research tries to determine the critical success factors (CSFs) involved in the adoption of e-commerce by SMEs. In addition, this subject is within the TAKFA plan that undertakes the developement and support of SMEs in e-commerce and information technology in Iran. The research test 'Davis's Technology Acceptance Model' (TAM) has been adjusted by the researchers with respect to the subject of the research. The place and time of the research has been the Yazd province from January to June 2010. As such, this paper tries to answer the following questions briefly:

1. What are the concepts, scopes and characteristics of SMEs?
2. How does e-commerce develop SMEs?
3. How does CSFs affect adoption of e-commerce by SMEs?
4. Which factors have a significant positive impact on the

Table 1. Definition of SMEs

Balance sheet total (€ million)	Capital turnover	Personnel	Enterprise category
43	50	>250	Medium-size
10	10	<50	Small
2	2	<10	Micro

adoption of e-commerce by SMEs?

RESEARCH LITERATURE AND BACKGROUND

E-commerce

There have been so many definitions given on e-commerce. As such, a lot of authors believe that e-commerce is any kind of exchange or transaction that occurs between an organization and a local element such as client, customer, colleague companies or government by using electronic devices. Some others only see it as the electronic purchase and sale of goods on electronic and computer network (Turban, 2002).

Chaffey (2002) sees e-commerce as buying and selling of goods via internet, while Kalakota and Whinston (1997) defines e-commerce from four viewpoints:

(1) Communicative viewpoint: E-commerce means the transmission of information, goods, services and/or paying money via electronic devices.
(2) Online viewpoint: E-commerce means buying and selling of information and goods online.
(3) Service viewpoint: E-commerce is a tool that simultaneously lowers the costs and increases the speed and quality.
(4) Commerce process viewpoint: E-commerce means a tool used for improving and accelerating working processes.

As it could be seen, a kind of expansion is found in the definitions given on e-commerce. If e-commerce is merely a kind of technology, it should have unity in definition. Since this status does not exist, one may state that e-commerce is something more than a technology. Now, with respect to the afore-mentioned subject, it could be stated that e-commerce means using the internet technology in order to exchange values (goods or services).

SMEs

It seems that there is no generally accepted definition of SMEs. Some definitions on SMEs have been offered in quantitative terms and some have been presented in qualitative terms. Some researchers state that the definitions should include both the quantitative dimension such as: the number of employees, measure of transactions, financial, non-financial resources and liquidity, and the qualitative dimensions, such as: the method of organizing and function performance (McGregor and Vrazalic, 2004). The classification system of North American industries use scales such as number of employees, total capital and dependence to industry in identifying SMEs. One of the descriptions of SMEs has been listed in Table 1 (Fathian et al., 2008). In Iran, different definitions of SMEs have been given. In the definition of small industries organization, small size production units are those industries that (Khaki, 1993):

1. Their investments in a production unit are up to 7,500 million Rials.
2. They have less than 50 employees.
3. They do not have artistic approach.
4. They are mechanized.
5. Their capital is fully Iranian.

According to the Ministry of Industries and Mines, industries with 10 to 50 employees are called small industries and industries between 50 and 150 employees are called medium size enterprises (Arshadi, 2006). This definition is used as the criterion in this research.

E-commerce in SMEs

Any SME has specific shares in economic growth, and for this purpose, information technology could be extracted in different ways. The first reason in the implementation of information technology could be cost reduction, while the second could be creation of business opportunities and the third and fourth reasons are usage of information technology in the production process and improvement of solidarity with partners and associates, respectively (Rothwell and Dodgson, 1993). Neergard (1992) investigated SMEs in Denmark, Ireland and Greek. As such, he identified four major reasons for accepting information technology, especially e-commerce by SMEs, as follows (Neergaard, 1992):

(1) It increases output.
(2) It improves services to customers.
(3) It simplifies the work process.
(4) It keeps record.

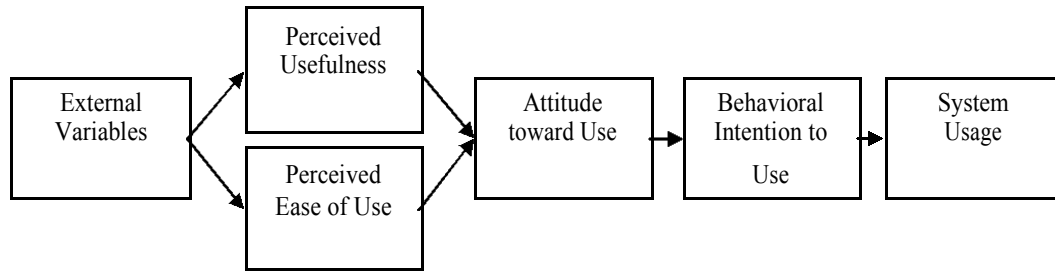Fathian et al. (2008) studied the effective factors of adopting

Figure 3. The Original technology acceptance mode (Reference: Davis, 1989).

adopting the electronic data interaction (EDI) as given by seven SMEs in different industries in Iran. As a result, he identified the perceived usefulness, organizational readiness and external pressure. He used awareness on direct and indirect advantages to measure the perceived usefulness. The financial and technological sources were variables of organizational readiness. For external pressure, he considered the competitive pressure and position through partners. As such, the result of his research concluded that external pressure was the main factor why small size enterprises accepted EDI. Kim and Ann (2004) in their study concluded that the level of information in industry, the degree of applied use of e-commerce and business strategy have a close relationship with e-commerce acceptance.

CONCEPTUAL MODEL OF THE RESEARCH

The 'technology acceptance model' (TAM) supports the study in order for it to identify and evaluate the critical success factors (CSFs) of e-commerce adoption by SMEs. At first, the model was introduced by Fred Davis in 1989. The interesting point is that this model has been designed specifically for information technology and has exclusively been used for that very purpose (Figure 3). Many studies have been conducted in the last decade to add parameters to TAM in order to make it reliable and to improve its durability. As such, those appended parameters were proved gradually and through empirical studies. Researches have added a third dimension, namely: "industry environment", to the two dimensions of Davis's model (Yu and Tao, 2009; Fathian et al., 2008; Oh et al., 2008; Simon and Paper, 2007; Al-Qirim, 2007; Elbeltagi et al., 2005; Saeed, 2003; Iacovou et al., 1995). Reviewing the literature shows that variables such as "innovative character of a firm" (Yu and Tao, 2009; Srite et al., 2008; Fathian et al., 2008; Oh et al., 2008; Al-Qirim, 2007), "industry competitive environment characteristics" (Sarlak et al., 2009; Yu and Tao, 2009; Oh et al., 2008; Al-Qirim, 2007; Iacovou et al., 1995) and "information technology maturity" (Srite et al., 2008; Hasan, 2007; McGill and Bax, 2007; Ma and Liu, 2005;

Chan and Lu, 2004; Chau, 2001; Iacovou et al., 1995) can be posited in the "industry environment" dimension to enable the model identify the variables that affect acceptance of e-commerce by SMEs.

Although Davis's primary model stated that the subjective norms variable does not significantly affect information technology acceptance, he omitted the subjective norms from his model. Later, studies claimed that many subjective norms affected many views in technology acceptance (Yu and Tao, 2009; Abbad, 2009; Nasco et al., 2008; Simon and Paper, 2007; Yu et al., 2005; Chan and Lu, 2004). Based on the empirical studies, the organizational decisions included rational and irrational elements. As such, the subjective norms could be considered as one of the irrational decisions of the organization. Therefore, subjective norms in the direction of accepting new types of technology could effectively be the concern of TAM. Finally, regarding the research literatures, the modified TAM concerned with the assessment of e-commerce CSFs by SMEs in Iran is shown in Figure 4.

Research variables

In this research, with respect to the conceptual model of research in Figure 2, the CSFs (independent variables) include: perceived usefulness, perceived ease of use, innovative character of the enterprise, the industry's competitive environment characteristics, information technology maturity and subjective norms. As such, the independent variable adopts e-commerce in SMEs of Iran. Thus, the afore-mentioned variables are discussed as follows:

Perceived advantages

The advantages obtained by using e-commerce in SMEs consist of the following two dimensions:

Perceived usefulness (PU): Many studies related to innovation have claimed that there is a positive relationship between technology acceptance and
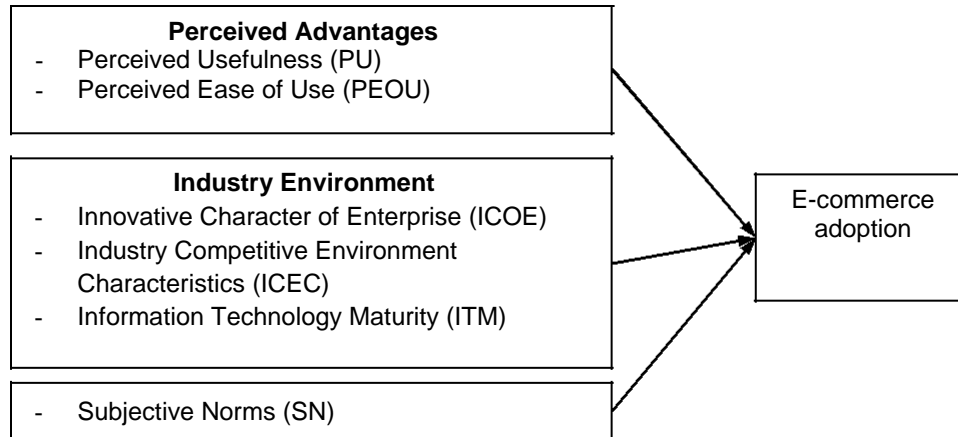
Figure 4. Conceptual framework of the research.

perceived usefulness. The perceived usefulness is attributed to the degree of a person's belief, that an information system and e-commerce contributes to the improvement of his job performance. For example, reducing the task time and/or, preparing information on time (Oh et al., 2008). Calisir (2004) stated that perceived usefulness helps the work to be performed faster and improve the efficiency and output of the worker. Davis (1989) used the perceived usefulness in technology acceptance and found out that this variable improves the output in executing job processes.

Perceived ease of use (PEOU): Lederer et al. (2000) found that three types of perceived ease of use include ease of understanding, ease of finding and information focusing. In this paper, the ease of use has been described as a system that helps the simplification of job processes. Therefore, if the company perceives the ease of use in executing work processes by using e-commerce, this would help them to accept it faster. The perceived ease of use could be based on the ease of taking orders, payment and information search.

Industry environment

The innovative character of an enterprise (ICOE)

In order to have a favorable view on accepting the new technology, the agreement of the higher-ranking management in directing employees' effort, education procurement, consultation by information staff and organizational support are necessary (Delone and Mclean, 1992) . Organizational support might be related to the innovative character of the company. Consequently, the innovative character of an enterprise is described as the degree of support given to adopt the new technology

in that company. Enterprises with more innovative personalities show greater trends to support the use of information technology (Oh et al., 2008). Anandarajan et al. (2002) stated that organizational support includes the encouragement of the higher-ranking management and the perceived ease of use and usefulness. Companies that anticipate innovation could be satisfied with the new technology services. In other words, if companies are conservative, they withdraw from accepting new technology. In addition, if the innovative companies perceive usefulness and ease of use in e-commerce, they will adopt it easily.

Industry competitive environment characteristics (ICEC)

Competition increases the probability of adopting technology. Many studies have shown that competitive pressure affects a company's decision on adopting information technology or e-commerce (Yu and Tao, 2009; Sarlak et al., 2009; Iacovou et al., 1995). In general, companies in intensive competition with their competitors adopt information technology to reduce the costs of their business processes.

Information technology maturity (ITM)

Information technology maturity is one of the important variables in the adoption of new technologies. To estimate information technology, maturity of companies demands a consideration of both hardware and software prerequisites.

Subjective norms (SN)

A subjective norm is defined as a "person's perception

that most people who are important to him think he should or should not behave in the manner in question" (Ajzen, 1991). Subjective norms are the summed products of normative beliefs and motivations that one should comply with. As such, normative beliefs represent an individual's perceptions of a person's tendency to behave in a manner consistent with their reference group's belief (Simon and Paper, 2007).

E-commerce adoption in SMEs

This term is used to check the degree of SMEs that is intended to adopt and expand e-commerce systems in the future.

RESEARCH HYPOTHESES

With respect to the literature and conceptual model of the research, the following hypotheses were tested:

(1) Perceived usefulness of electronic commerce may have a significant positive impact on the successful adoption of electronic commerce by SMEs.
(2) Ease of use of electronic commerce may have a significant positive impact on the successful adoption of electronic commerce by SMEs.
(3) The innovative character of the enterprise may have a significant positive impact on the successful adoption of electronic commerce by SMEs.
(4) The industry's competitive environment characteristics may have a significant positive impact on the successful adoption of electronic commerce by SMEs.
(5) Information technology maturity may have a significant positive impact on the successful adoption of electronic commerce by SMEs.
(6) Subjective norms may have a significant positive impact on the successful adoption of electronic commerce by SMEs.

Statistical population and sample

Existence of many SMEs in Yazd province as one of the industrial pillars of Iran and the excessive attention to the development of SMEs through modern industries, particularly information technology adds to the necessity of studying this issue. The statistical population that is being studied in this project consists of managers of information technology in SMEs of Yazd province that is performing e-commerce. In fact, this is one of the advantages of the research that the questionnaires are given to those who are involved in the industry and as such, they have necessary specialty in e-commerce. To identify those industries and formation of statistical population, the questionnaires of industrial workshops in 2008, as executed by the governor's general offices across the country, were studied. As noted before, the criteria of this research in identifying SMEs is the definition given by the Ministry of Industries and Mines of Iran. According to these definitions, companies with 10 to 49 employees were classified as small size enterprises, while companies with 50 to 149 employees were classified as medium size enterprises. To form the statistical population, companies whose products and employees are in the concerned range were selected, giving 223 companies for this research; of which 143 of them were small size and 80 were medium size enterprises. The volume of the sample was found from the following formula that gave the value of 64. By using stratified sampling methods, the sample members were selected.

$$n = \frac{Z^2 S_2^2}{d}$$

Instruments

To test the data collected from the library review, slips and field surveys, questionnaires were used. The questionnaire was developed to collect the views of sample members in connection with the hypothesis questions using a 5-point Likert ranking spectrum (ordinal). It consists of three sections. In the first section, the key words of the questionnaire, such as CSFs, e-commerce and SMEs were described so that the respondents would have sufficient knowledge on the contents of the questionnaire. In the second section, the indices of hypotheses were listed in 30 questions. The indexes were collected from several sources and by taking the views of experts in screening, the important and basic indexes that could have more important effects in the SMEs in Iran were selected. Table 2 lists the indexes in each hypothesis. In the third section, information on descriptive statistics of the enterprises and respondents were mentioned. The questions for this part consists of age and gender of the subjects, education and number of employees, type of internet activities and the duration of performing e-commerce system. When the questionnaire was developed, it was given to 13 elites of e-commerce (including officials of e-commerce in SMEs, statistics and information units of governors in general, commerce chamber, university professors, etc.) along with the research model and they unanimously, with some minor adjustments in the questions, confirmed the questionnaires.

Creditability and reliability

Using "concurrent validity", questionnaires were distributed among ten managers of SMEs' information technology units, which were in different levels of performing e- commerce and as such, ambiguous questions were edited at the next edition of the questionnaire. Cronbach correlation was used for the evaluation of the questionnaire's reliability through the use of 10-responders (SMEs) preliminary sample. However, the result of Cronbach correlation test is shown in Table 3.

RESULTS

After data collection, the information was extracted and classified. As such, the demographic characteristics of responders are shown in Table 4. Among other instances studied in this paper, one may note the method of e-commerce usage by SMEs. The levels of e-commerce usage are shown in Figure 5. As it is seen, obtaining information is the highest (93%) usage of e-commerce by companies. The next case is information presentation, by which 44% of companies use this option in line with activities of the company. Unlike those two cases, companies use fewer finding partnership and perform ministerial affairs and banking operations in line with their activities.

Table 2. Questionnaires indices as per hypotheses.

Hypothesis	Index
PU	E-commerce system helps me to do my job and duties faster.
	E-commerce system allows me to reduce my job errors.
	E-commerce system helps me to make savings in my job.
	E-commerce system helps to improve the competitive advantages in industry.
	E-commerce system helps in increasing communication with customers, suppliers and partners.
PEOU	E-commerce system allows me to search for goods and place orders more easily.
	Using e-commerce system allows me to gain important information easier and faster.
	Acquiring e-commerce system is simple to use.
	Acquiring e-commerce system does not require subjective efforts.
	Using e-commerce system enables me to provide reports on time and according to schedules.
ICOE	Our company provides new technologies trainings.
	Our company has more information technology staff than similar companies.
	The senior executive manager provides suitable financial resources for developing information technology.
	Our company uses internet and electronic data processing.
	In our company, most job reports are prepared by the management information systems (MIS).
ICEC	Our company has good security system in using e-commerce.
	Our company has a good quality network.
	Our company has a high speed network.
	Our company has an e-commerce related hardware.
	Our company has an e-commerce related software.
ITM	Our company products' life ends fast.
	Our company has an information technology that we use to adjust and give variation to our products.
	Our company has intensive competitions with its competitors in providing a part of its demands.
	Our company has high competitions in attraction of buyers' views.
	Our company has high competitions in providing suppliers.
SN	Most significant companies use e-commerce in their work processors
	Most trade partners use e-commerce in the process of their work.
	Most competitors of the company use e-commerce in their work processes.
	The trade partners confirm that accepting e-commerce increases competition advantage.
	Company's competitors in industry confirm that accepting e-commerce increases competition advantage.

Table 3. Reliability of measurements.

Constructs	No. of items	Cronbach's alpha ( )
Perceived usefulness	6	0.889
Perceived ease of use	5	0.855
Innovative character of enterprise	5	0.835
Industry competitive environment characteristics	3	0.788
Information technology maturity	5	0.822
Subjective norms	5	0.802
Entire questions	5	0.832

Table 4. Demographic characteristics of responders and enterprises.

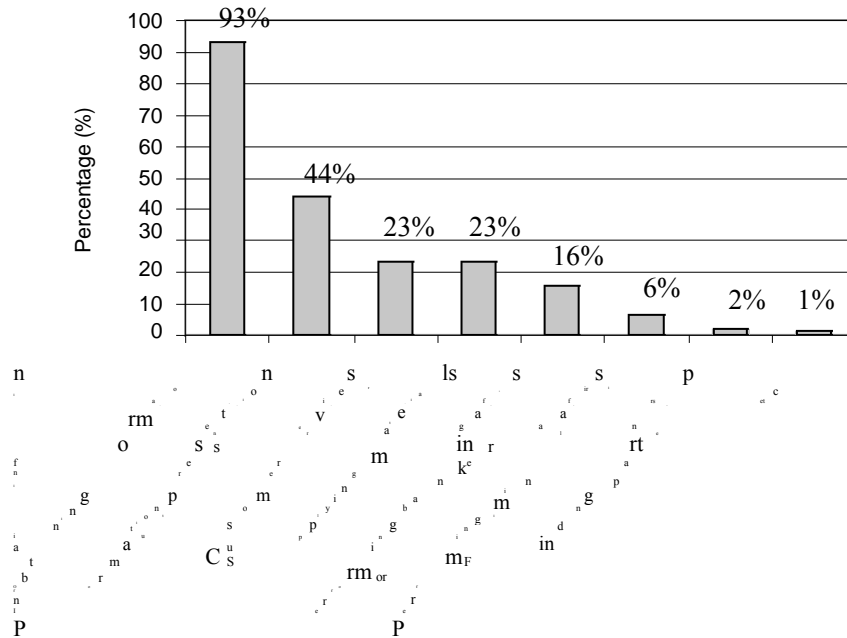| Demographic characteristic	Percentage
Gender	
Male	89
Female	11
Education	
High school diploma	2
Associate degree	9
Bachelor's degree	8
Master degrees and higher degrees	81
Position	
Manager of IT unit	71
Owner	26
Others	3
Over 50 years	2
Age (years)	
Less than 30	51
30 to 40	34
40 to 50	13
Duration of EC adoption (months)	
Less than 24	21
12 to 24	37
24 to 36	21
Over 36	16

Figure 5. Method of e-commerce usage by SMEs.

Table 5. Results of Pearson's correlation test.

Hypothesis	Independent variable	Dependent variable	Sig. (2-tailed)	Pearson correlation	Results
1	Perceived usefulness	Successful adoption of e-commerce in SMEs	0.000	0.93	Accepted
2	Perceived ease of use	Successful adoption of e-commerce in SMEs	0.000	0.85	Accepted
3	Innovative character of enterprise	Successful adoption of e-commerce in SMEs	0.000	0.79	Accepted
4	Industry competitive environment characteristics	Successful adoption of e-commerce in SMEs	0.052	0.24	Rejected
5	Information technology maturity	Successful adoption of e-commerce in SMEs	0.000	0.92	Accepted
6	Subjective norm	Successful adoption of e-commerce in SMEs	0.000	0.90	Accepted

Table 6. Ranking of variables.

Mean rank	Independent variable
4.21	Perceived usefulness
3.51	Perceived ease of use
1.17	Innovative character of enterprise
3.04	Industry competitive environment characteristics
3.07	Information technology maturity
4.21	Subjective norm

Pearson's test

The results of Pearson's correlation test on hypotheses with 0.05 error level are shown in Table 5. Since Pearson's correlation coefficient in the first hypothesis is 93% (having the highest level of correlation efficiency), the first hypothesis is supported, and at a confidence level of 95%, it can be claimed that perceived usefulness of electronic commerce have a significant positive impact on successful adoption of electronic commerce by SMEs. Also, Table 5 shows that the correlation is significant as per hypothesis (H_2) and perceived ease of use (0.85), which implies that it has a positive impact on successful adoption of e-commerce by SMEs. The same table also shows that the correlation is significant for the following three reasons: innovative character of enterprise (0.79) as per hypothesis (H_3), information technology maturity (0.92) as per hypothesis (H_5) and subjective norm (0.90) as per hypothesis (H_6).

Regarding Table 5, industry competitive environment characteristics (0.24) have an insignificant correlation and impact on successful adoption of e-commerce by SMEs and therefore, H_4 is rejected.

Friedman test

Friedman test is used in variables' ranking with its importance affecting e- commerce adoption. In other words, higher rank shows more effectiveness of the independent variable on the dependent variable and has more importance. The results of Friedman test are mentioned in Table 6. Therefore, the variable of perceived usefulness is placed in the first rank.

DISCUSSION

The result of Figure 4 shows that the SMEs subject of the study is in the initial stages of adopting e-commerce and it needs hard work until it reaches its final stage. This

calls for great attention and effort. In this study, independent variables include: perceived usefulness, perceived ease of use, information technology maturity, innovative character of enterprise, industry competitive environment characteristics and subjective norms, while successful adoption of e-commerce in SMEs is the dependent variable.

Considering acceptance of the first hypothesis, it seems that parameters with more tangible usefulness have more effective role in the successful adoption of e-commerce. Parameters such as increase in speed of doing duties, reducing costs, strong relationships with customers and suppliers cause the officials of SMEs to touch the perceived usefulness of performing e-commerce objectively. Since SMEs implementation of e-commerce increases access to information, most companies use those in their e-commerce. In addition, to convert manual systems to mechanized systems, it seems that there are strong reasons that confirm the second hypothesis. Results in Table 5 imply that innovative character of the enterprise, information technology maturity and subjective norm have a significant positive impact on successful adoption of e-commerce by SMEs.

Regarding Table 5 results, no significant positive correlation was found between the degree of the industry's competitive environment characteristics and the adoption of e-commerce by SMEs (H_4). In the studies of Oh et al. (2008), no significant relationship was found between variables of "degree of industry competition" and accepting e-commerce in the SMEs of Korea. Also, Yu and Tao (2009) failed to find a relationship between competitive environment and acceptance of electronic shopping. However, Al-Qarim (2007) identified a relationship between competitive environment and the extranet that is attested positively and significantly. It seems that the major reason for rejecting hypothesis H_4 is lack of interaction between local firms and foreign companies. The little investment of foreign companies in Iran due to low permanency of economic policies has led to the absence of serious competitors before local firms. As such, the result extracted from Table 6 shows that, the variable of perceived usefulness has the highest impact on the successful adoption of e-commerce by SMEs, followed by perceived ease of use, subjective norms, information technology maturity and innovative character of enterprise, in the next ranks, respectively.

CONCLUSION AND RECOMMENDATIONS

This study uses the modified technology acceptance model to study the CSFs in successful adoption of e-commerce in SMEs. To investigate this relationship, Pearson's correlation test was used, while Freedman analysis of variance test was used to classify CSFs. In the correlation test, hypotheses 1, 2, 3, 5 and 6 were confirmed and only hypothesis 4 was rejected. In other words, variables of perceived usefulness, perceived ease of use, innovative character of enterprise, information technology maturity and subjective norms have a significant positive impact on adoption of e-commerce in SMEs. However, industry competitive environment characteristics were found to have an insignificant correlation with the dependent variable. The results of Freedman test were used for classifying the variables. Therefore, the variable of perceived usefulness had the highest rank in terms of its effect on the dependent variables, while the variables of perceived ease of use, subjective norms, information technology maturity and innovative character of enterprise were in the next ranks.

The study establishes a general viewpoint on the effective factors in successful adoption of e-commerce by SMEs in Yazd province and reminds the state authorities and provinces of the important and basic factors. The results of this study could be useful for academic postgraduate studies. In addition, concerned organizations such as townships company in the province should consider the results of this research to develop e-commerce in SMEs. This study covers solely the SMEs in production industries and it is suggested that such research should be carried out for the SMEs in service industry as well. Besides, future researchers are recommended to study the relationship between the identified CSFs (such as subjective norms or innovative character of enterprise) and adoption of e-commerce in a micro and more detailed form.

REFERENCES

Abbad MM, Morris D, Nahlik C (2009). Looking under the Bonnet: Factors Affecting Student Adoption of E-Learning Systems in Jordan. Int. Rev. Res. Open Distance Learning, 10:(2)1-25. Available at: http://www.irrodl.org/index.php/irrodl/article/viewArticle/596/1218

Aghazadeh H, Esfidani M (2006). Study of E-Commerce Mature Level of Iran Paramount Exporters in 2003. J. Econ. Res., No.75, pp 75-109. Available at: http://www.noormags.org/view/Magazine/ViewPages.aspx?ArticleId=219385

Ajzen I (1991). The theory of planned behavior. Organizational Behavior and Human Decision Processes, 50, pp 179-211. Available at: http://www.people.umass.edu/aizen/obhdp.html

Al-Qirim N (2007). The adoption of eCommerce communications and applications technologies in small businesses in New Zealand. Electronic Commerce Research and Applications Vol. 6, N 4, pp 462–473. DOI: 10.1016/j.elerap.2007.02.012

Anandarajan M, Igbaria M, Anakwe UP (2002). IT acceptance in a less-developed country: a motivational factor perspective. International J. Inf. Manage., 22(1): 47–65. DOI: 10.1016/S0268-4012(01)00040-8

Arshadi V (2006). The Plan to Study and Identify the Barriers of Investment in Production (with approach of reforming laws in small and medium size industries sector). Research Centre of Islamic Legislative Assembly, Tehran, Iran. Available at: http://www.spac.ir/barnameh/351/p-4.htm

Calisir F (2004). The relation of interface usability characteristics, perceived usefulness, and perceived ease of use to end-user satisfaction with enterprise resource planning (ERP) systems. Comp. Hum. Behav., 20(4): 505-515. DOI: 10.1016/j.chb.2003.10.004.

Chaffey D (2002). E-Business and E-commerce Management: Strategy, Implementation and Practice. Prentice-Hall, London.

Available at: http://www.pearsonhighered.com/educator/product/EBusiness-and-ECommerce-Management-Strategy-Implementation-and-Practice/9780273719601.page

Chan SC Lu MT (2004). Understanding Internet Banking Adoption and Use Behavior: A Hong Kong Perspective. J. Glob. Inf. Manage., 12(3): 21-43. DOI: 10.4018/jgim.2004070102, Available at: http://www.igi-global.com/Bookstore/Article.aspx?TitleId=3610

Chau YK (2001). Influence of Computer Attitude and Self-Efficacy on IT Usage Behavior. Journal of End User Comput., 13(1): 26-33. DOI: 10.4018/joeuc.2001010103, Available at: http://www.igi-global.com/Bookstore/Article.aspx?TitleId=3732.

Davis FD (1989). User Acceptance of Computer Technology: A Comparison of Two Theoretical Models. Manage. Sci., 35(8): 982 - 1003. DOI: 10.1287/mnsc.35.8.982

DeLone WH, McLean ER (1992). Information systems success: the quest for the dependent variable. Inf. Syst. Res., 3(1): 60–95. DOI: 10.1287/isre.3.1.60

Elbeltagi I (2005). Evaluating the Factors Affecting DSS Usage by Senior Managers in Local Authorities in Egypt. J. Global Info. Manage.,13(2): 42-65. DOI: 4018/jgim.2005040103. Available at: http://www.igi-global.com/Bookstore/Article.aspx?TitleId=3623

Farrokhzad S (2004). Design Necessary Stages in E-Commerce Application to Extension of Services and Products Exports. Institute of Trade Studies and Research, Tehran, Iran. Available at: http://www.itsr.ir/About.aspx?I=6&G=6

Fathian M, Akhavan P, Hoorali M (2008). E-readiness assessment of non-profit ICT SMEs in a developing country: The case of Iran. Technovation, 28: 578–590. DOI: 10.1016/j.technovation.2008.02.002

Hasan B (2007). Examining the Effects of Computer Self-Efficacy and System Complexity on Technology Acceptance. Information Resour. Manage. J., 20(3): 76-88. DOI: 10.4018/irmj.2007070106 Available at: http://www.igi-global.com/bookstore/Article.aspx?TitleId=1322

Iacovou CL, Benbasat I, Dexter AS (1995). Electronic data interchange and small organizations: adoption and impact of technology. MIS Q., 19(4): 465–485. Available at: http://www.highbeam.com/doc/1G1-18299892.html

Kalakota R, Whinston A (1997). Electronic Commerce. A Manager's Guide, Addison Wesley, Reading, MA. Avaiable at: http://books.google.com/

Kearney AT (2002). Assessment of Excellence in Procurement: How Leaders Create Value Through e-Supply Management. A.T. Kearney Inc., Chicago. Avaiable at: http://www.atkearney.com/index.php/Publications/creating-value-through-strategic-supply-management.html.

Khaki Gh (1993). Comparison between Information systems in small and medium size enterprises. Collection of Papers of Role and Status of Small Industrial Units in State Economic-Social Development.

Kim YD, Ann CG (2004). An empirical analysis on the performance of e-trade by the utilization level of international commercial enterprises. Korea Acad. Int. Bus., 15(1): 53–78.

Lederer AL, Maupin DJ, Sena MP, Zhuang Y (2000). The technology acceptance model and the World Wide Web. Decis. Support Syst., Vol. 29, No. 3, pp 269–282. DOI: 10.1016/S0167-9236(00)00076-2

Ma O, Liu L (2005). The Role of Internet Self-Efficacy in the Acceptance of Web-Based Electronic Medical Records. J. Organ. End User Comput., 17(1): 38-57. DOI: 10.4018/978-1-59140-926-7.ch003, Available at: http://www.igi-global.com/bookstore/Chapter.aspx?TitleId=7031

McGregor R, Vrazalic L (2004). SMEs and Electronic commerce: an over view of our current knowledge. In: E-Commerce in Regional Small to Medium Enterprises (eds R. Mcgregor and L. Vrazalic) pp. 1-24, IGI Global Publication. DOI: DOI: 10.4018/978-1-59904-123-0.ch001, http://www.igi-global.com/Bookstore/Chapter.aspx?TitleId=8929

McGill T, Samantha B (2007). From beliefs to success: utilizing an Expanded TAM to Predict Web Page development success. Int. J.Technol. Human Interact., 3(3): 36-53. DOI: 10.4018/jthi.2007070104, Avaiable at: http://igi-global.com/Bookstore/Article.aspx?TitleId=2906

Nasco S, Toledo A, Grandón E, Mykytyn P (2008). Predicting electronic commerce adoption in Chilean SMEs. J. Bus. Res., 61: 697–705. DOI: doi:10.1016/j.jbusres.2007.06.047

Neergard P (1992). Microcomputers in small and medium-size companies: benefits achieved and problems encountered. In: Proceedings of the Third Australian Conference on Information Systems. Wollon gong, pp. 579–604, Available at: http://www.eii.edu.au/acis

Noori R (2007). Investigating on E -Commerce Mature Level in Iran's Exporter Industrial Companies. J. Commer. Bull., 42: 147-165. Available at: http://system.parsiblog.com/Archive48492.htm

Oh KY, Cruickshankb D, Anderson B, Alistair R (2008). The adoption of e-trade innovations by Korean small and medium sized firms. Technovation, 27: 1-12. DOI: 10.1016/j.technovation.2008.08.001

Rothwell R, Dodgson M (1993). Technology-Based SMEs: Their Role in Industrial and Economic Change. Int. J. Technol. Manage., Special Publication on Small Firms and Innovation, pp. 8–22

Saeed KA (2003). Toward an Integrative Framework for Online Consumer Behavior Research: A Meta-Analysis Approach. J. End User Comput., 15(4): 1-26. DOI: 10.4018/joeuc.2003100101, Available at: http://www.igi-global.com/Bookstore/Article.aspx?TitleId=3773

Sanayei A (2002). Electronic Commerce in third Millennium. Academic Research Center Publication of Esfahan, Esfahan, Iran. Available at: http://www.adinebook.com/gp/product/964609841X

Sarlak MA, Abolhasani AA, Forozandeh HL, Ghorbani DA (2009). Investigating on E-commerce Acceptance Barriers in Dried Fruits Producing- Exporting Companies of Iran. World Appl. Sci. J., 6(6): 818-824. Available at: http://idosi.org/wasj/wasj6(6)2009.htm

Simon SJ, Paper D (2007). User Acceptance of Voice Recognition Technology: An Empirical Extension of the Technology Acceptance Model. J. Organ. End User Comput., 19(1): 24-50. DOI: 10.4018/joeuc.2007010102, Available at: http://www.igi-global.com/Bookstore/Article.aspx?TitleId=3821

Srite M (2008). Does Within Culture Variation Matter? An Empirical Study of Computer Usage. J. Global Inf. Manage., 16(1): 1-25. DOI: 10.4018/jgim.2008010101, Available at: http://www.igi-global.com/Bookstore/Article.aspx?TitleId=3663

Turban AD (2002). Electronic Commerce 2002: A Managerial Perspective. Prentice – Hall. Available at: http://www.pearsonhighered.com/educator/academic/product?ISBN=0130653012

Yu CS, Tao YH (2009). Understanding business-level innovation technology adoption. Technovation, 29: 92–109. DOI: 10.1016/j.technovation.2008.07.007

Yu J, Ha I, Choi M, Rho J (2005). Extending the TAM for a t-commerce. School of Business, Inf. Manage., 42(7): 965–976. DOI: 10.1016/j.im.2004.11.001.