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Identifying and Prioritization of Challenges and Barriers of E-commerce Implementation in Iran

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Abstract: Nowadays, with the expansion of Internet, tools have been built to help vendors to set up Web stores, building the store databases and managing the order processing and payment transactions. These tools typically do not focus on issues like the personalization of the interaction with the customers. But, using of these tools commonly has a barriers and challenges especially in implementation. In this article we are identifying the important challenges and barrier of e-commerce implementation in Iran. So, we prioritized those challenges to finding the most important challenges among them. Finally we suggest many courses of action to solving those barriers and challenges. For this goal, we use AHP method to challenges prioritization. Since many of our data are qualitative and such data might be ambiguous, we transform the qualitative terms into quantitative terms by using the fuzzy collections. Then we use Fuzzy AHP (FAHP).

Key word: Barriers and challenges . e-commerce implementation . FAHP . fuzzy approach

INTRUDUCTION

Many firms in developing countries are in the preliminary stages of the adoption of E-Commerce (EC). The transition of firms in these countries to more sophisticated levels of EC use and adoption depends in part, on the extent to which they are inclined to use these new technologies for their business. Not all organizations are equally strongly inclined towards adopting EC [1-5] have suggested that the extent of EC adoption depends on the attitude of the organization towards EC technologies and the inclination or the propensity to deploy and use them. These findings have parallels in studies on the individual acceptance of technology [6-7] and the diffusion of innovations in organizations [4, 8-10]. Understanding of the causal factors behind differences in organizational inclination towards EC adoption is essential for enabling organizations to assess the extent to which they are inclined to develop, deploy and use EC. It also gives pointers to possible factors, which can be controlled in order to alter and manage the extent of this inclination. Briefly, e-commerce adoption and its implementation counter with many challenges and barriers [11].

Nowadays-commerce is fundamentally changing the economy and the way business is conducted. E-commerce forces companies to find new ways to expand the markets in which they compete, to attract and retain customers by tailoring products and services to their needs and to restructure their business processes to deliver products and services more efficiently and effectively. However, despite rapid and sustained development of e-commerce, many companies doing e-business are still in the investment and brand-building phase and have yet to make a profit [12]. Many e-businesses (or Internet companies) have focused on the visual attractiveness and ease of use of their Web sites as the primary method of increasing their customer base. However, as e-businesses shift their focus from building a customer base to increasing revenue growth and profitability, they should re-evaluate their current business strategies, if any and develop new way to implement E-C for achieving a path to profitability.

During the early days of E-commerce development (particularly in the case of EDI implementation), larger companies tended to pressure their smaller trading partners into adopting the technology-the so-called "EDI or die" approach. Founded that, in such situations of forced adoption, smaller trading partners had no alternative to adopting the technology. Iacovou *et al.* [13] believed that this response was inevitable within a business environment-competitive pressure and imposition by trading partners were the dominant influence in EDI adoption for smaller companies.

There are, of course, real benefits (both direct and indirect) to be obtained from the introduction of EDI, as Pfeiffer [14] and Iacovou *et al*. [13] point out. While not all of the benefits have been achieved, this factor has succeeded in encouraging some companies to adopt these technologies. Nonetheless, the major benefits

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have tended to be gained by the larger, "hub" companies involved in EDI implementations, such as supermarkets or manufacturers. During some earlier investigation of implications of E-commerce implementation [15] founded that when a company has adopted a technology or application, three factors? ttechnological, organizational and environmental-generally affect the process of the implementation. Technology-related factors are associated with the characteristics of the technology/application itself, including complexity, compatibility and relative advantage. Organizational factors are primarily concerned with the people involved in the implementation in organizations and affect such issues as management support, user resistance and the level of expertise available. Environmental factors focus on the environmental context of the organization and include such factors as supplier-customer relationships and competitive pressure.

This paper examines and identifies factors that determine the different barriers for the adoption and implementation of EC. That is main goal of this article. In addition, in this article we prioritize those challenges by FAHP. In doing so, it provides a framework for identifying the main challenges which EC implementation encounter with them.

At present, there are many and varying interpretations of terms like e-commerce and e-business, owing mainly to the number of parties, technologies, applications and communications networks involved. Much of the confusion has centered upon whether definitions are confined to financial transactions over the Internet or not. Contrast, for example E-commerce refers to trade that actually takes place over the Internet, usually through a buyer visiting a seller's site and making a transaction there [16]. E-commerce is the exchange of information across electronic networks, at any stage in the supply chain, whether within an organization, between businesses, between businesses and consumers, or between public and private sectors, whether paid or unpaid [17].

Transactional e-commerce has been further categorized according to the parties involved. Cornford and Jones [18] have come up with four permutations: business to business ('b-t-b'-for example, COVISINT); business to consumer ('b-t-c'-for example, Amazon); consumer to business ('c-2-b'-for example, letsbuyit; fixed price tendering) and consumer to consumer ('c-t-c'-for example, E-bay). Market analysts and researchers seem to concur that b-t-b has the most market potential [19]. B-t-c's market share remains small and formidable barriers to wider adoption remain, including security and fulfillment issues and lingering doubts as to whether the Internet will ever be a suitable medium for purchasing certain types of goods where personal inspection is necessary. Sales over the Internet of some types of goods such as groceries are expanding rapidly, however, if from a low base. Although much current attention is devoted to transactional e-commerce because of its profound implications for supply-chain relationships and conventional retailing and because non-transactional computer networking within and between firms is not as novel, it seems an unduly narrow perspective. Much information available over the Internet is free but can have an economic value, especially if it is manipulated. Similarly, there is a considerable amount of b-t-b activity for intermediate goods and process information, often conveyed using electronic data interchange, but increasingly by intranets and extranets. Businesses tend to prefer the term e-business to e-commerce because the most dynamic firms are those which have reconfigured their entire operations so that they can apply current ICT-in particular the Internet-to every aspect of their business, not just to their retailing and marketing activities. Enterprise resource planning, which enables firms to pull together all their information bases into a single workable unit, is a major growth area for leading business consultancy firms such as Price Waterhouse Coopers, KPMG, CapGemini and Arthur Andersen. Hence the wider definition is preferred here. Measuring the extent of e-commerce activity in different localities is not straightforward either. Conventional economic data do not distinguish between electronic and non-electronic activity and whether sales have been made by electronic or conventional means.

E-commerce is quite unlike a conventional economic sector in that its significance lies in the medium through which activities take place rather than the specific nature of the activities themselves. Conceivably, firms in well-established sectors such as retailing, transport and distribution sectors could, if they gear up technologically, not merely exploit ecommerce for their own ends but also provide extremely marketable services to other companies. Recent debates about old and new industries' relative prospects for dominating e-business demonstrate the dangers of restricting attention to just ICT firms [20].

The relationship between local policy intervention and e-commerce activity is also dif. cult to gauge since local agencies such as local authorities, business support organizations and higher educational institutions (HEIs) have not yet devised, *et al.* one agreed, indicators for measuring the value added of support programmes. Irrespective of the particular product or service transacted electronically, a range of supportive services are involved including electronic communications infrastructures and nodes, website

development, electronic marketing, transactional security and transport logistics. The approach taken in this paper is to focus mainly on infrastructure businesses such as hardware and software providers, network service providers and enabling services. The range, number and size of such firms in a particular locale and their economic performance serve as a rough proxy for the extent to which other local firms are seeking to become e-businesses and also an indication of each locality's overall share of what is a booming market. The shortage of quantitative data has meant that research has necessarily been mainly of a qualitative nature. Empirical evidence was assembled from a combination of sources including a review of secondary literature, an analysis of available data about ICT firms and specifically e-commerce companies and a series of semi-structured interviews. These were conducted with senior personnel in a sample of 30 rapidly expanding firms providing Internet services, HEIs and economic development bodies in Greater Manchester and Merseyside. The study did not explicitly focus on either 'dotcoms'-companies exclusively providing retail and other services over the Web-or existing 'bricks and mortar' firms that have developed their own e-commerce capability.

The former are not well represented in either conurbation and have in any case experienced a dramatic fall from favor in recent months. Despite initial euphoria and in many cases substantial injections of venture capital funding, many dotcoms have found it dif. cult to generate sufficient Internet sales revenue to cover their substantial establishment, marketing, fulfillment and customer service costs. 'Old economy' firms already possess such systems and have often sought to disinter mediate b-2-c dotcoms. Furthermore, the rapid fall in the valuation of many 'dotcoms' has enabled existing firms to acquire them and their expertise at bargain prices (for example, Argos-Breathe.com; GUS-Jungle.com). The study did not survey existing firms' use of e-commerce in depth. Many were reluctant to divulge their e-business plans. Generating a suf. Ciently large sample to allow for different sectors' approach to utilizing e-commerce was infeasible in a provisional assessment of this nature. Research has shown that some types of businesses, such as business services, manufacturing and wholesale/retail, have more of a presence on the Web than others [21]). However, Internet service suppliers gave a reasonable impression of client firms' outsourcing requirements.

EC CHALLENGES

All organizations are not equally inclined to develop and deploy new IT. The adoption of new IT (Especially EC) applications is influenced largely by factors related to overall organizational attitudes and culture as well technical and infrastructural factors [22]. Many practitioners have suggested that different managers and organizations adopt different attitudes towards IT, depending on its perceived usefulness in the context of their work and on Organizational norms regarding the acceptance of new IT. Similar findings have been reported in the literature on EC adoption. Iacovou *et al.* [13] and Crook and Kumar [6] suggest that organizations may be differently inclined towards EC adoption. That is, become most important in the national level of EC implementation. The literature identifies two broad aspects, top management and organization culture, that influence organizational inclination to adopt EC.

FUZZY NUMBERS AND LINGUISTIC VARIABLES

In this section, some basic definitions of fuzzy sets, fuzzy numbers and linguistic variables are reviewed from Buckley [23], Negi [24], Zadeh [25]. The basic definitions and notations below will be used throughout this paper until otherwise stated.

Definition 1: A fuzzy set Ã in a universe of discourse X is characterized by a membership function $\mu_{\tilde{A}}(x)$ which associates with each element x in X a real number in the interval [0, 1]. The function value $\mu_{\tilde{A}}(x)$ is termed the grade of membership of x in Ã (Kaufmann and Gupta, 1991).

Definition 2: A fuzzy set Ã in the universe of discourse X is convex if and only if

$$\mu_{\tilde{A}}(\lambda x_1 + (1-\lambda)x_2) \geq \min(\mu_{\tilde{A}}(x_1), \mu_{\tilde{A}}(x_2))$$

For all x1; x2 in X and all $\lambda \in [0,1]$
Where min denotes the minimum operator

Definition 3: The height of a fuzzy set is the largest membership grade attained by any element in that set. A fuzzy set Ã in the universe of discourse X is called normalized when the height of Ã is equal to 1 [23]

Definition 4: A fuzzy number is a fuzzy subset in the universe of discourse X that is both convex and normal. Figure 2 shows a fuzzy number ñ in the universe of discourse X that conforms to this definition Definition5. The α'-cut of fuzzy number ñ is defined as:

$$\tilde{n}^{\alpha} = \{x_i : \mu_{\tilde{n}}(x_i) \geq \alpha, x_i \in X\}$$

where $\alpha \in [0,1]$.

The symbol $\tilde{n}^0$ represents a non-empty bounded interval contained in X, which can be denoted by $\tilde{n}^\alpha = [n_l^\alpha, n_u^\alpha]$, n_l^α and n_u^α are the lower and upper bounds of the closed interval, respectively. For a fuzzy number $\tilde{n}$, if $n_l^\alpha > 0$ and $n_u^\alpha \le 1$ for all $\alpha \in [0,1]$ then $\tilde{n}$ is called a standardized (normalized) positive fuzzy number [24].

Definition 6: A positive triangular fuzzy number (TFN) $\tilde{A}$ can be defined by a triplet $\tilde{A} = (a_1, a_2, a_3)$. Shown in Fig. 4. The membership function is defined as:

$$\mu_A(x) = \begin{cases} 0, & x \prec a_1 \\ \dfrac{x - a_1}{a_2 - a_1}, & a_1 \le x \le a_2 \\ 1, & x = a_2 \\ \dfrac{x - a_3}{a_2 - a_3}, & a_2 \le x \le a_3 \\ 0, & x \succ a_3 \end{cases}$$

A non-fuzzy number r can be expressed as (r, r, r). The a-cut of the fuzzy number $\tilde{A}$ which can be denoted by $A_\alpha = [A_\alpha^l, A_\alpha^u]$, is shown in the Fig. 4.

Given any two positive TFNs, $\tilde{m} = (m_1, m_2, m_3)$ and $\tilde{n} = (n_1, n_2, n_3)$, some main operations of fuzzy numbers $\tilde{m}$ and $\tilde{n}$ can be expressed as follows:

$$\tilde{m}(+)\tilde{n} = (m_1 + n_1,\ m_2 + n_2,\ m_3 + n_3)$$
$$\tilde{m}(-)\tilde{n} = (m_1 - n_3,\ m_2 - n_2,\ m_3 - n_1)$$
$$\tilde{m} \otimes \tilde{n} \cong (m_1 n_1,\ m_2 n_2,\ m_3 n_3)$$
$$\tilde{m}(\div)\tilde{n} \cong \left(\frac{m_1}{n_3}, \frac{m_2}{n_2}, \frac{m_3}{n_1}\right)$$

Definition 7: A matrix $\tilde{D}$ is called a fuzzy matrix if at least one element is a fuzzy umber [23].

Definition 8: A linguistic variable is a variable whose values are expressed in linguistic terms [26]. The concept of a linguistic variable is very useful in dealing with situations, which are too complex or not well defined to be reasonably described in conventional quantitative expressions [26]. For example, ‘‘weight’’ is a linguistic variable whose values are very low, low, medium, high, very high, etc. Fuzzy numbers can also represent these linguistic values.

According to fuzzy utilization, each expert person should represent its opinion for each choice (for thi article each challenge), which is an accomplished person should state to what extent will satisfy different criteria. This evaluation for satisfying criteria by choices is done in the from of following scale elements(s).

S_7	Outstanding (OU)
S_6	Very high (vh)
S_5	High (h)
S_4	Medium (m)
S_3	Low (l)
S_2	Very low (vl)
S_1	Non (n)

Additionally, each expert person should represent importance degree of different criteria in its view in the form of "S" scale. Next step in this process is unit evaluation of each expert person for its choice.

FUZZY AHP APPROACH

Since fuzzy set theory was introduced by Zadeh [25] and subsequently expanded by Bellman and Zadeh [25], who described the decision-making methods in fuzzy environments, an increasing number of studies have dealt with uncertain fuzzy problems by applying fuzzy set theory. Because consumers often cannot clearly estimate the relative importance of each considered criterion in terms of numerical values, fuzziness as we mentioned earlier is applicable. Thus, this paper includes decision-making theory, which considers the possible fuzzy subjective judgment during the evaluation process. We use triangular fuzzy numbers (TFN) in the fuzzy AHP to derive the relative importance for each criterion of non-store retailing channel choice and the performance value for each criterion of each choice can also be determined by evaluators. After the synthetic performance values of alternatives are derived, then we rank the alternatives based on the best non-fuzzy performances (BNP).

We introduce brief notions about fuzzy numbers and linguistic variables below.

A fuzzy number, $\tilde{A}$, is a fuzzy subset of a real number and its membership function is $\mu_{\tilde{A}}(x)$:

$R \to [0,1]$, where x represents the criteria and it is described by the following characteristics [14]: (1) $\mu_{\tilde{A}}(x)$ is a continuous mapping from R to the closed interval [0,1]; (2) $\mu_{\tilde{A}}(x)$ is a convex fuzzy subset; (3) $\mu_{\tilde{A}}(x)$ is the normalization of a fuzzy subset, which means that there exists a number x_0 such that $\mu_{\tilde{A}}(x) = 1$. According to the characteristics of triangular fuzzy numbers and the extension principle put forward by Zadeh [25], the operational laws of two triangular fuzzy numbers could be derived easily. Moreover,

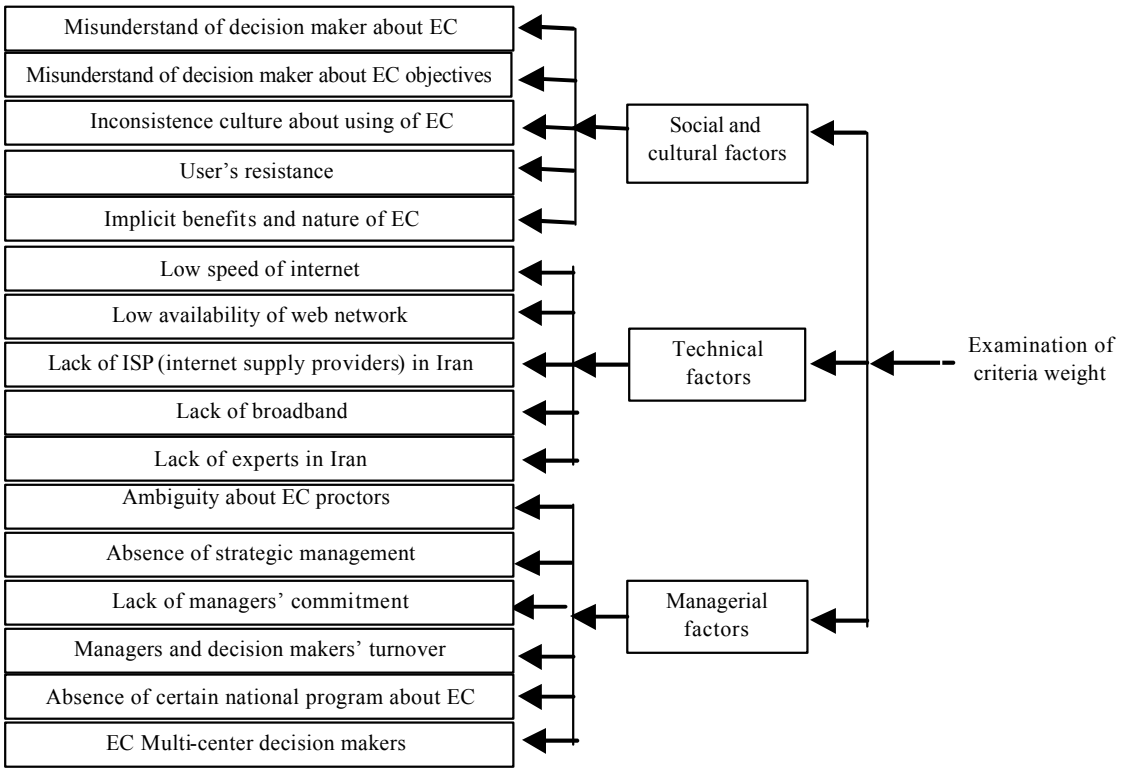

Fig. 1: EC challenges examination

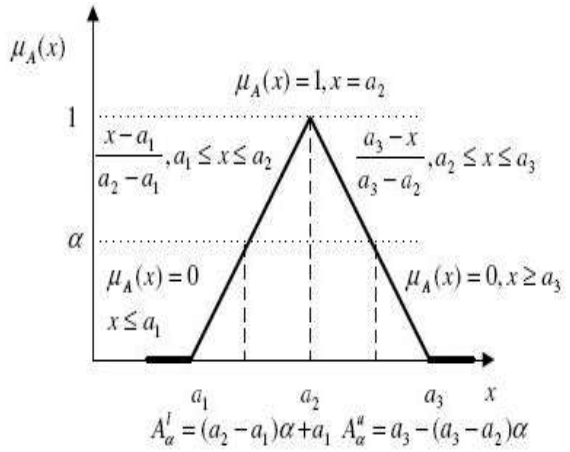

Fig. 2: A positive triangular fuzzy number, its membership function and a-cut

conventional quantification is hard to express reasonably those situations that are overtly complex; thus the notion of a linguistic variable is necessary in such situations. A linguistic variable is a variable whose values are words or sentences in a natural or artificial language.

We use this kind of expression to compare two valuation criteria by linguistic variables in a fuzzy environment as "absolutely important," "very strongly important,""essentially important," "weakly important," and "equally important" with respect to a fuzzy five-level scale to derive the relative importance of the criteria. It is consistent with Saaty's [27] suggestion that the comparisons of the criteria be made in the range of 1/9 to 9. A 9 indicates that one criterion is extremely more important than the other; a 1/9 indicates that one criterion is extremely less important than the other; and a1 indicates equal importance. Also, if the importance of one criterion with respect to a second is given then the importance of the second criterion with respect to the first is the reciprocal. These pair-wise comparisons are summarized in a pair-wise comparison matrix. Furthermore, linguistic variables are also used as a way to measure the performance value of alternatives for each criterion as "very low," "low," "fair," "high," and "very high". In this paper we employ triangular fuzzy numbers (TFN) to express the fuzzy scale.

METHODOLOGY

After indicating the challenges and barriers of EC, we examine the important challenges by use of FAHP.

Traditional AHP needs exact judgments. In addition, due to the complexity and uncertainty involved in real world decision problems, it is sometimes unrealistic or even impossible to perform exact comparisons. Since fuzziness and vagueness are common characteristics in many decision-making

Table 1: Fuzzy number of main criteria

	Technical factors	Social and cultural factors	Managerial factors
Managerial factors	(4.92,4.36,3.82)	(5.05,4.43,3.87)	(1,1,1)
Social and cultural factors	(0.95,0.78,0.64)	(1,1,1)	(0.26,0.23,0.20)
Technical factors	(1,1,1)	(1.57,1.28,1.06)	(0.26,0.23,0.20)

Table 2: Gaining the importance of each criteria (challenges)

Major criteria	Sub criteria	Ratio weight	Weight	Final weight
Managerial factors	Ambiguity about EC proctors	0.128		0.049
	Absence of strategic management	0.330		0.128
	Lack of managers' commitment	0.064	0.538	0.024
	Managers and decision makers' turnover	0.0387		0.150
	Absence of certain national program about EC	0/059		0.022
	EC Multi-center decision makers	0.032		0.012
Social and cultural factors	Misunderstand of decision maker about EC	0.10		0.033
	Misunderstand of decision maker about EC objectives	0.28		0.092
	Inconsistence culture about using of EC	0.18	0.254	0.059
	User's resistance	0.32		0.105
	Implicit benefits and nature of EC	0.11		0.036
Technical factors	Low speed of internet	0.15		0.0088
	Low availability of web network	0.09	0.208	0.0053
	Lack of ISP (internet supply providers) in Iran	0.58		0.0340
	Lack of broadband	0.10		0.0059
	Lack of experts in Iran	0.08		0.0047

problems, a good decision-making model needs to tolerate ambiguity or vagueness. Decision makers often provide uncertain responses rather than precise judgments and the transformation of qualitative preferences to point estimates may not be sensible; hence, linguistic values, whose membership functions are usually characterized by triangular fuzzy numbers, can be utilized to estimate preference ratings instead of conventional numerical equivalence method. Due to the fact that uncertainty should be considered in some or all of the pair-wise comparison values, the pair-wise comparison under traditional AHP, which needs to select arbitrary values in the process, may not be appropriate. It is therefore more natural or realistic that a decision maker is allowed to provide fuzzy judgments instead of precise comparisons. A number of methods have been developed to deal with fuzzy comparison matrices. For example, Chang proposed an extent analysis method, which sums up each row of a fuzzy comparison matrix, normalizes them and then compares them by defining a degree of possibility of one fuzzy number being greater than or equal to another one. gives crisp weight estimates for fuzzy comparison matrices. Zhu made a discussion on the extent analysis method and improved the formulation of possibility degree for comparing two triangular fuzzy numbers. Leung and Cao proposed a fuzzy consistency definition with consideration of a tolerance deviation and determined fuzzy weights via a-level sets and the extension principle. Buckley directly fuzzified Saaty's [27] original procedure of computing weights in hierarchical analysis to get fuzzy weights. Csutora and Buckley proposed a Lambda-Max method, which is the direct fuzzification of the well-known kmax method. Wang presented a modified fuzzy logarithmic least square method (LLSM) for fuzzy analytic hierarchy process. Numerous research papers have been done with the application of fuzzy AHP. The application of fuzzy AHP has become popular in recent years, too.

Considering the fuzziness in the decision data and group decision-making process, linguistic variables are used to ratings of each alternative with respect to each criterion. We can convert the decision matrix into a fuzzy decision matrix and construct a weighted-normalized fuzzy decision matrix once the decision-makers' fuzzy ratings have been pooled. we define the fuzzy positive ideal solution (FPIS) and the fuzzy negative ideal solution (FNIS). You can see two common fuzzy numbers.

After many interview with experts we recognize the importance challenges in first level. Note that, for gathering data we use many instruments especially questionnaire. Our questionnaire sett as AHP method which need to pair wise comparisons. After setting the

Table 3: Final prioritization of challenge in Iran

Priority	Sub criteria	Ratio weight	Final weight
1	Managers and decision makers' turnover	0.387	0.150
2	Absence of strategic management	0.330	0.128
3	User's resistance	0.320	0.105
4	Misunderstand of decision maker about EC objectives	0.280	0.092
5	Inconsistence culture about using of EC	0.180	0.059
6	Ambiguity about EC proctors	0.128	0.049
7	Implicit benefits and nature of EC	0.110	0.036
8	Lack of ISP (internet supply providers) in Iran	0.580	0.034
9	Misunderstand of decision maker about EC	0.100	0.033
10	Lack of managers' commitment	0.064	0.024
11	Absence of certain national program about EC	0.059	0.022
12	EC Multi-center decision makers	0.032	0.012
13	Low speed of internet	0.150	0.0088
14	Lack of broadband	0.100	0.0059
15	Low availability of web network	0.090	0.0053
16	Lack of experts in Iran	0.080	0.0047

first framework of questionnaire, we present it for 20 experts for content and construct validity. After that we distribute final questionnaire among practitioner, experts and manager of company which has web site and use EC in their work.

Finally, we determined 3 main challenges for EC implementation in Iran include: Technical factors, Social and cultural factors and Managerial factors which shown in Fig. 1. After first level of challenges, we detailed those challenges to many factor.

GATHERING DATA AND ANALYSIS

To determine the main challenges which Iranian EC encounters with, we develop a questionnaire and distribute among practitioner as we noted. After précis of data we examine weight of each challenge. You see result in Table 1. We shown the fuzzy number of each challenge. In this step, we use FAHP to recognize the weight of each main criterion.

We note that, after examining the main challenges and barriers of EC implementation, we need to investigate what are the main sub factors of each category. Result of this step is very important for presentation policy and Corse of action to winning on them. Table 2 present importance of each sub factor. For achieve importance of each sub factor, we multiple main factor to degree of each sub factor.

In next step, with attention of gaining weight in previous step, we find the ratio and final weight of sub criteria.

Table 3 had shown the result of this step. With attention to gaining results in Table 3 we prioritize this result in Table 4.

CONCLUSION

One of the important effects of internet in this millennium on business is electronic commerce. In this article we focus on barriers and challenges of electronic commerce implementation in Iran. For this aim we recognize three main barriers and challenges. We named those main challenges as main criteria. Under those, we recognize the actual challenges that we named them as sub criteria. The main factors which achieved in this article were managerial factor, Social and cultural factors and Technical Factors. Based on this article findings most important barrier of e-commerce in Iran is managerial factor. As we shown in Table 3 the weight of this factor was 0.538. We can result from this, more than half of total problem of e-commerce stem from managerial factor. The whole weaknesses of managerial factor become the serious problem in many division and session of e-commerce in Iran. In fact we haven't unique organization for EC. Consequently, many organizations active in this part but separately and haven't integrity.

About sub criteria, Managers and decision makers' turnover in Iran is a serious problem. This very important problem, redounded many problem. One of the important problems that stem from this, is absence of any integrated view and program about e-commerce because of managers turnover. As you see in Table 4 second factor is absence of strategic management. Maybe, this problem stem from managerial turnovers.

Finally, in spite of this article purpose (our goal is not presentation course of action) we suggest number of course of action to facilitate the EC implantation in Iran:

Iranian government need to pursue a strategic perspective in all organization related to EC.

Privatization is a major activity to EC effectiveness.

Many of infrastructures still are weak in Iran. For best EC Iranian need to best infrastructure.

EC in Iran need a EC experts. Training of experts in Iran assures the sustainable development about EC.

Training EC manager by means of academic course (for example EC management) help to winning on managerial weakness.

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