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Qualitative Examination of Inter-Agency Electronic Trade Based on Advanced Technology

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Abstract. A review of the trend of the world trade of the products based on information and communicative technologies within the recent two decades shows that the developing countries have seriously been seeking to obtain appropriate competitive position in the field of software industry. Regarding the importance of competition for the senior managers of the Iranian agencies which are active in the software industry and the necessity of having an accurate understanding to succeed in the competition arena, it is tried via a research activity, to offer a conceptual model on the basis of qualitative approach to make clear the competitive capability of the agencies active in the development software industry. This article is an attempt to detect the qualitative features ofinter-agency (B2B) electronic trade soft wares. To do this, first of all, through competition of standards and models of software quality, the features of a model are chosen as the basis. Then by studying the qualitative features of the B2B dealings phases and examining the existing qualitative criteria in the current systems, the qualitative features of the soft wares are detected and added to the basic features. Finally an applied system will be evaluated on the basis of these features and the results will be analyzed. The method of this research is descriptive-analytical and has been done on the basis of library studies.

Key Words: software quality, qualitative features, electronic trade, B2B, competitive capability, software industry.

1. Introduction:

Today, electronic trade is considered as one of the real manifestations of applying information and communications technology. The ample advantages of using electronic trade is so much paid attention to by all beneficiaries hat some of the companies have chosen the electronic trade strategy as their competitive strategy. Presently more than 80 percent of the world electronic trade is related to the B2B transactions [16]; while on the other hand one of the most important factors of success of the agency to do the transactions is the ability to make effective electronic relations with the commercial partners. Considering that, in the electronic trade, this relation is carried out through B2B systems; the quality of these systems plays a very important role to establish an efficient and lasting relation among commercial partners. To assess the quality of each software it is necessary to recognize the special qualitative features of that system to evaluate their quality on the basis of those features. In order to get the qualitative features the following method will be adopted: First, the history of the subject will be reviewed through describing it. In the next part, by studying and examining the quality models and evaluation standards of software quality, a model, with more comprehensive qualitative features for evaluating the B2B systems, will be selected as the basis of development. To detect the qualitative features of the B2B systems first of all the qualitative needs of every phase will be examined by reviewing the B2B transaction phases. Then the qualitative features of the B2B software will be obtained and added to the basic model via comparing and examining the existing qualitative standards. Finally, using the obtained features, the quality of an applied system will be evaluated as a case study.

2. History of Subject

The trans-agency electronic trade abbreviated as B2B, includes the transactions that are carried out among agencies via computer networks (internet, extranet, intranet, or private networks). These agencies could be private, governmental, profiteering, or nonprofit. The obvious characteristic of the B2B is that in this system the agencies try to improve their commercial processes through making them electronic. The B2b electronic trade came to existence in the early 90s via electronic data interchange networks (EDI). Therefore prior to the year 2000 most of the articles and researches on B2B have been conducted on different usages of these networks. Although EDI would allow companies to send purchase request directly; and enjoyed advantages like reduction of expenses and speed of doing the processes, it was not a proper choice for most large companies. Thus the buyers and sellers substituted EDI systems by internet to carry out their commercial transactions. The related studies and researches done after that were mostly concentrated on the patterns categorizing the electronic transactions markets and the B2B transactions models. But during the recent years, regarding the competitive atmosphere of market and work, most of the researches are related to examining and detecting the factors which affect the sustainability and profiteering of such transactions [10], [12].

3. Research Approach

This research is a development and applied one, because, on the basis of a fundamental model and through studying theoretical literature, first it presents a developed model for the B2B softwares. Secondly, by the use of the proposed research model, an applied system will be evaluated as a case study. This research is a descriptive- analytical type and is done on the basis of library studies.

4. Studying and Examining Software Standards and Quality Models

The software quality standards that have been so far presented are divided to two major groups of hierarchical and non-hierarchical ones [6]. In the hierarchical group, that often has two levels, the quality features in the first level and the second level have secondary characteristics similar to those features. The relation among the level sections of a model's quality could be one-to-one or multiple-to-multiple. The most important hierarchical models include: Mc Call model, Boehm model, Dromey model, and ISO model. The non-hierarchical models, too, have the same structure and are generally divided to Star and Bayzin categories [7], [5], and [4]. Table (1) gives a simple comparison between these models. The aim of this comparison is to examine the strong and the weak points of these models to choose the best and most proper qualitative features as a basis for evaluating the B2B softwares.

As it is shown in table (1), the ISO model is more complete than the other presented ones and has removed the defects of the previous models. So it is chosen as the development basis for the proposed model of this article. The reasons of choosing this model are the special features of the model most important of which are as follows: Comprehensiveness of qualitative features, understandability in the hierarchical structure, common terms and titles, precise and clear definition of components, having measurement standards. Despite all advantages of the ISO model, since the defined qualitative features in the model are very general and public, every software should be specially developed and improved. Therefore in the succeeding sections the special qualitative features of the B2B softwares will be detected and added to the ISO model.

Table 1- comparison of Software Quality Models [1] , [15]

Quality Model	Structure	Number of levels	Relation among components	Defects	Advantages
Mc Call	Hierarchical	Two	Multiple-to-multiple	Overlapping among components	Having Measurement standard
Boehm	Hierarchical	Two	Multiple-to-multiple	Luck of Evaluation standard	Having Characteristics related to the software
URPS	Hierarchical	Two	One-to-multiple	Paying no Attention to Transferability	Separation of practicable and Impracticable Needs
Dromey	Hierarchical	Two	One-to-multiple	Disintegration of model components	Presentation of model according to special features of softwares
ISO	Hierarchical	Three	One-to-multiple	_ _ _ _ _ _ _ _	Comprehensiveness of Qualitative features-having Evaluation standard
Star	Non- Hierarchical	_	One-to-multiple	Lack of evaluation	Presentation of Qualitative

				standard	features from several viewpoints
BBN	Non- Hierarchical	_	multiple-to-multiple	Lack of evaluation standard	High precision due to weighty Qualitative features

5. Detecting Qualitative Features of B2B Softwares

In this stage the qualitative features special for the B2B applied softwares should be detected and obtained. Since the most important characteristic of the B2B systems is becoming electronic of the processes in different phases of the B2B transactions; first, through reviewing B2B transaction phases, the qualitative needs of every phase are examined. Then by comparing and examining the qualitative standards existing in the successful B2B systems in the world, the B2B softwares qualitative features will be detected.

4-1- Examining Qualitative Needs of B2B Transaction Phases

In the B2B electronic trade every transaction consists of 5 main phases each of which has several electronic processes [9]. In this section, in addition to defining these processes, the qualitative features needed for each phase will be explained.

5.1. Research and Planning: In the first step the agencies research and plan for their transactions (buying and selling) to see what they need, how much they need and under what conditions they need; then they search for their necessary information about products and services. One of the greatest challenges of the agencies in this phase is to present timely information about the potential commercial partners. Generally the information is preserved in the internal systems of the organization and it is only accessible to the personnel and the managers of the organization, and not the commercial partners; whereas for a practical B2B system to be successful there should be an integration among the subordinate systems inside the organization and outside it, and the recent information about the products' characteristics and the existing condition should be accessible for the potential commercial partners. Therefore integration is the most important qualitative feature in this phase of transaction.

5.2. Detection: In the next phase the research for finding commercial partner on the needed product is done. Thus the seller searches on the internet to find potential clients and the buyer, too, searches for the proper provider. The softwares used in this phase should have qualitative features such as reviewability, accessibility, variety and efficiency of searching methods, adaptability, clarity, equal capability of user absorption, possibility of determination, localization of the information, and integration.

5.3. Negotiation: In this phase the primary talks on the way of transaction among the commercial partners are carried out and, having officially interchanged the information, a series of agreements are finalized. These negotiations which are usually done with the aim of the best price can be done in different ways like offering purchase proposals, dealing, and dynamic price determination. If needed, at the end of the negotiations the agreement is settled, too. The softwares that are used in this domain must have the qualitative features such as practicability, easy usage, efficiency in the time behavior, understandability, mutual reliability and credibility, learnability and possibility of presenting different ways of spending.

5.4. Implementing the Transaction Obligations: In case of settling agreement the transaction enters the fourth phase in which the agencies must act according to the obligations. This phase is the most important phase of conducting the process of B2B buying and selling, because majority of the reactions are done in this phase in a way that the manufacturer produces the materials, finalizes his designs, packs and distributes them. The buyer, too, receives the dealt goods in the place of agreement, examines it, and pays his expenses and obligations. The softwares that are used in this domain should have qualitative features such as security and efficiency of spending process, system capability and traceability, integration with the systems inside the organization, fault reparability, accessibility and usability.

5.5. Post-implementation: The last phase is the operation after implementing the transaction which includes clearances, final inspections, interchange of documents and finalizing mutual obligations. The operations done in the post-implementation phase pertain to the services after

selling, training, installation, and presenting information by the seller to the buyer. These include the information like introducing new products according to he interest of the buyer (to do this a comprehensive information bank for the buyers is necessary in the system). Introducing new services means technical maintenance services on the products and goods, conditions for returning or changing the products. The softwares used in this domain must have qualitative features like reviewability, capability of ordering, compatibility, capability and traceability, accessibility, efficiency in time behavior, and presenting up-to-date information.

6. Studying and Examining Successful B2B Softwares

In the previous section the qualitative features of each of the B2B transactions phases were examined. To determine the important qualitative indexes of the B2B softwares it requires studying the successful systems in this domain so that the qualitative features of the softwares are detected. The superior software manufacturing companies have offered various B2B solutions with different components and characteristics. Here, according to the studies and researches done on the comparison of the existing electronic trade systems [11], [8], the products of six valid companies presenting B2B softwares including *People Soft, IBM, Microsoft, Siebel SAP* and *Oracle* are compared, and the existing features in these softwares are categorized in table (2).

Table 2- Summing up and comparison of Qualitative features of B2B Softwares [8] , [11]

Qualitative feature	Importance Grade	Qualitative feature	Importance Grade	Qualitative feature	Importance Grade
Integration	5	Comparability	3	Replaceability	1
Security	5	Usability	2	Globalizational facilities	1
Efficiency	5	Manageability	2	Changeability	1
Accessibility	5	Interactability	2	Adaptability	1
Final cost	3	Practicablity	2	Supportability	1
Reliability	3	Being ordered	2	Presentation of technical support services	1

7. Presenting Qualitative Features of the B2B Electronic Trade Softwares

As it was mentioned in the previous sections, for obtaining qualitative features of the B2B softwares, first by comparing quality models, the qualitative features of the ISO model were chosen as the basis. Then through examining the qualitative requirements needed for the B2B transactions processes and studying superior softwares in this domain, qualitative features special for these softwares were detected. In this section, by comparing the existing qualitative features in the ISO model and the detected qualitative features special for the B2B softwares, it became clear that the structure of the qualitative features of the ISO model are suitable for evaluating B2B softwares. Therefore regarding the comprehensiveness of the qualitative features of the model's first level it is necessary to add the qualitative features special for the B2B systems as the subordinate qualitative indexes.

The obtained indexes for the B2B softwares that do not exist in the ISO model include: integration, follow-up capability, accessibility, ordering capability and reviewability. On the basis of defining the features of the model's first level these indexes should be put at the proper place in the second level of the model. Thus the two subordinate indexes of traceability and integration are added to practicability, accessibility is added to reliability, and the two subordinate indexes of capability of ordering and reviewability are added to usability.

8. Evaluation of a B2B System by Using the Proposed Qualitative Features

In this section, by using the obtained qualitative features, the quality of an applied B2B system is evaluated as a case study. The software that is chosen as the case study is the ISACO Portal which makes it possible to create online connection between this company and the providers and the native and foreign distributors. In this section first the company is shortly introduced and then the ISACO Portal will be evaluated.

The ISACO Company is one of the subordinate companies of Iran Khodro Industrial Group which was established in 1986 with the aim of provision, distribution, export and import of the spare parts of different cars. All activities of ISACO Company can be divided in three categories: Providing necessary parts and spare parts for different cars, distributing spare parts to all representatives inside the country, and exporting the needed parts and spare parts to the countries where the Iran Khodro products have been exported. ISACO Company, with a wide network of distribution channels covering a proper geographical span in the regional offices, has the possibility to offer services to all over the country. Moreover, having around 2500 shops, representatives and selling agencies, it is able to provide parts and spare parts throughout the country.

In the ISACO Portal one can create online link with all distribution channels inside the country and the sources of foreign providers. This system consists of two sections, namely, intranet and the website. Similar to each of the subsystems of the website there is a subsystem in the intranet that, beside the website, is connected to the data site of the complex designed with Oracle software. That is why there is a complete integration among the subsystems inside the organization and the website of the company and this issue is the superior feature of the system which distinguishes it from the similar systems.

To evaluate the system it requires providing a check list for quantitative measurement of the obtained qualitative features. The questions of the check list are of two types; the first are the questions that must be answered by the developer and maintainer of the system and are mostly related to the qualitative features of maintainability, transferability and reliability. The second are the questions raised from the view point of the skilled user and are mostly related to evaluation of qualitative features of usability, efficiency and practicability of the system. Considering the fact that in the ISACO Company these systems are produced by the engineering team of the company's local software and are maintained by the same organ, the questions of the first group are answered by the software team supporting the portal and the questions of the second group are answered by ten expert users.

In this check list there are 68 questions designed for quantitative measurement of 25 subordinate qualitative features (second level). For quantitative measurement of each subordinate feature some questions are raised in the check list whose answers are given on the basis of 0-4. Thus the amount of the subordinate similar features will be attained. At last the final quality of the system will be obtained on the basis of the amounts of the six main qualitative features. As the obtained results in table three indicate the final quality of the ISACO Portal is 71.68%.

Table 3- Quantitative Amounts of Qualitative features for ISACO Portal Evaluation

Row	Main Qualitative feature (first level)	Quantitative amount from 4	Qualitative Subordinate feature (second level)	ISO model or B2B system	Quantitative amount from 4
1	Practicability	3.67	Proportionality	ISO Model	3.20
			Precision	ISO Model	3.40
			Integration	B2B System	4.00
			Security	ISO Model	4.00
2	Reliability	3.12	Maturity	ISO Model	2.80
			Fault Tolerance	ISO Model	2.33
			Fault Reparability		4.00
			Accessibility	B2B System	3.33
3	Usability	2.91	Understandability	ISO Model	2.50
			Learnability	ISO Model	2.00
			Practicability	ISO Model	2.60
			Attraction	ISO Model	4.00
			Capability to order	B2B System	3.00
			Reviewability	B2B System	3.33
4	Efficiency	2.25	Time Behavior	ISO Model	2.50
			Source Usage	ISO Model	2.00
5	Maintainability	2.75	Analysis Capability	ISO Model	2.75
			Changeability	ISO Model	2.25
			Stability	ISO Model	2.67
			Examinability	ISO Model	3.33
6	Transferability	2.54	Adjustability	ISO Model	2.50
			Installibility	ISO Model	2.25

			Co-existence	ISO Model	1.75
			Replaceability	ISO Model	3.67

9. Conclusion and Suggestions

In this article the qualitative features for evaluating the quality of the electronic trade softwares were presented. First by comparing the standards and models of software quality the features of a model were chosen as the basis. Then by studying the qualitative features of the B2B transactions phases and examining existing qualitative standards in the B2B systems, the qualitative features of the B2B softwares were detected and added to the features of the basis.

Since the electronic trade systems are naturally new, wide scale research on the evaluation of the quality of these systems will be possible in future. As it is necessary to gain access to qualified product so that besides the evaluation of the product, the quality of the production process and development of the systems are studied; one way for continuation of researches is paying attention to the qualitative features along different stages of establishing the system. Moreover, regarding the importance of the software features varies in the eyes of different people including the developer, the supporter, the user and the manager; each feature should be effective in proportion with its importance in the final evaluation. Therefore, weighing the qualitative features by different people can be a good basis for the future researches.

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