

Relationship between qualitative characteristics of data extracted from accounting information systems and E-commerce in warehouses of Iranian petrochemical industry

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Abstract: The present study aims to investigate the relationship between qualitative characteristics of accounting information extracted from e-commerce and accounting information systems in warehouses of the Iranian petrochemical industry. This is an applied study in terms of purpose and a descriptive-analytical survey in terms of the data collection method. The statistical population includes all 150 financial and senior managers of all 50 petrochemical companies in the city of Assaluyeh. Sampling was not performed due to the limited number of population subjects. For this purpose, 180 questionnaires were distributed, of which 144 were returned and finally, after the reviews, 136 questionnaires were accepted to be used in data analysis. SPSS v.18 was used for statistical analysis of the data obtained from the questionnaires. Finally, the results showed that in the petrochemical industries of Iran, there is a significant relationship between the qualitative characteristics of accounting information extracted from e-commerce and accounting information systems. There is also a statistically significant relationship between effectiveness, quality, timeliness, and comparability of information extracted from the risk control e-commerce and accounting information system. On the other hand, in this industry, there is no statistically significant relationship between the usefulness and reliability of information extracted from the e-commerce customer satisfaction and accounting information system.

Keywords: accounting information systems, e-commerce, effectiveness, quality, timeliness

Introduction

The accounting information system consists of three main components, inputs, processors, and outputs. These three components are controlled through various monitoring tools, but with the advent of e-commerce, several major problems have arisen, the most important of which is the loss of control over the inputs of e-commerce on the Internet. Anyone who wants to do business with a company over the Internet, regardless of their good or bad intentions, can enter its website. Second, failure to control these inputs may in some way lead to intrusion into the accounting information system and theft or disclosure of important information for unauthenticated individuals. Third, vendors lose their trust in the company if some important information is leaked, and eventually, system outputs lose credibility if system inputs are wrong or intruded on.

In general, it can be said that companies are afraid to link their accounting systems with e-commerce, despite its great outcomes. However, this fear could be overcome if there is a control system that links accounting information to e-commerce. The importance of this research comes mainly from the significance of e-commerce and the role that companies in the third world in general and Iranian companies in particular play in globalization and ensuring their survival and ability to compete.

Also, finding a mechanism to protect the accounting system for those companies that use the Internet will encourage many companies to use e-commerce and achieve macro-returns that help develop the

national economy in various fields. If a model is provided that links the accounting information system and e-commerce, the protection of the accounting system can be enhanced in a scientific and organized manner for those companies that want to use e-commerce. Therefore the national economy could be protected from cyber hackers and the confidence of shareholders could be increased.

Since the accounting system is the backbone of any company, its strengthening and improvement greatly help protect the company and its growth in a more effective way. The results of a study by AlKakhen (1988) show the accounting control methods used in the computer department of the Central Bank of Jordan and its electronic accounting system are suitable for achieving accuracy and speed in extracting information from processing the entered data based on clear and specific control methods. Also, the computer department needs to complete some of its shortcomings using general control procedures, especially since there is no qualified internal audit department to follow these methods. Al-Halwa (2000) showed that investing in computer and communication technology reduces costs. Also, investment in computer and telecommunications technology will lead to an increase in bank profits, an increase in the participation rate and the number of depositors, as well as increase in the level of services provided to customers. Banks cannot continue to operate and provide services to customers without the use of information and communication technology. According to the above, the present study is to investigate the relationship between qualitative characteristics of accounting data extracted from accounting information systems and e-commerce in the warehouses of Iran's petrochemical industry.

Theoretical foundations

Accounting information systems

The information system is the main resource of appropriate information for the administrative decision-making process. The information system is defined as "a group of properly associated components to generate useful information and provide this information to users in an appropriate and timely manner, to help them in the performance of their duties (MuhammadQasem). To be able to adapt to the great transformations in this new business atmosphere of e-commerce, accountants have to be familiar with the required technologies and information and to be able to evaluate them and control all e-commerce transactions and become familiar with the associated modern concepts.

By the end of 1997, accounting and auditing firms became aware of the importance of e-commerce, expecting e-businesses to earn more than \$ 1 trillion by the end of 2002. Accounting has become a leader in developing e-commerce standards. This is because the related companies should be able to use e-commerce for their business environment (Appalraju, 1998). The American Society of Certified Public Accountants, in collaboration with the Canadian Bar Association, established a special committee tasked with examining the market demand for e-commerce certification services. This is due to the capabilities of both accounting and auditing professions to respond quickly to these needs. The committee studied the market and concluded that consumers are concerned about electronic transactions.

A study by Hadithi (1993), entitled "Evaluation of internal control systems for computer-using institutions - A field study of financial and banking institutions in the Hashemite Kingdom of Jordan, aimed at evaluating the power of general and applied internal control methods in financial institutions for organizational and system access control, and control of documents and the development of data and file security systems. The results showed a direct relationship between age of the institute, capital, and number of employees, number of workers in the computer department, number of departments of the institution, and number of offices using computers. Age of computer department, the number of projects, and each of the components of document monitoring, general control, and internal control are not related significantly to the use of internal control procedures or components, organizational affiliation, or job level of the computer manager.

The study by Sarhan (1995), entitled "The relationship between technology and organizational structure - A field study in Jordan public industrial joint-stock companies" showed a relationship between technology and concentration rate. There was showed to be a relationship between technology and the degree of formality. There is also a relationship between technology and complexity in general. The study by Radayedeh (1998), entitled "The effect of automated processors on accounting

information systems - An applied study in the Jordan Customs Administration”, showed that accounting information systems are greatly affected by automated data processing.

A study by Ramadhan (1999), entitled: “Factors affecting accounting information systems in Jordanian public industrial joint-stock companies”, aimed at measuring the impact of environmental factors, regulators, and decision-making methods on the accounting information systems used in Jordanian public industrial joint-stock companies. It was found that there is a relationship between environmental factors and accounting information systems. Given that the companies of the research sample did not welcome these factors, and that they did not know enough about the role and importance of the environment, there is no relationship between organizational factors and accounting information systems.

E-commerce

The term e-commerce has been around since 1994. In e-commerce, financial and commercial exchanges may occur between different institutions and individuals through one of the electronic means of communication. Some argue (Zairi, 2002) that one of the most important changes made through e-commerce is the emergence of a new type of economy called symbolic economy which runs along with the real-world and service economy (). E-commerce has brought about fundamental changes in the business environment where accountants and auditors work, and these changes can be summarized as follows:

1. **Organizational structure:** E-commerce has completely changed the structure of the company and has made its nature completely technical. It is well known that traditionally, facilities were paid conventionally and the factor of time was not as urgent as now. Currently, the purchasing process takes place in an instant, and to adapt to high speeds, the organizational structure must include the necessary mechanisms that enable it to track, ensure, and implement the process. What makes the job more difficult is the complexity of the operations that take place over the Internet, especially given the horrific violations that can be committed by hackers. For the accountants and auditors to keep pace with this fast operation, they have to learn this technology very well, otherwise, the whole process will become useless.
2. **Location of Business:** This is one of the most important and dangerous changes taken place through e-commerce. In the traditional system, transactions were performed in certain places and markets, and in case of any mistake or problem, it was easy to understand and correct. Now, with the use of advanced technology, anyone from anywhere in the world can make transactions by pressing a key on the computer keyboard, and in many cases, tracking the process and the person is almost impossible. One of the specific problems of e-commerce companies includes violations that could not be discovered until it is too late.
3. **Distribution Channels:** In the past, the distribution (sales) channels of a company's products were well-defined, well-known, and uncomplicated, enabling the company to determine and deal with the source of the process. However, due to the emergence of the different types of e-commerce, distribution channels are intertwined and became more complex. So, in case of any error, it may take a long time to determine the distribution channel in which the error has occurred.
4. **Forms and means of sales:** These are somewhat different from distribution channels, and here, it should be said that in the past, sales means included qualified people. But now, under the light of e-commerce, sales means have evolved into computer programs in various forms, including audio and video, and many systems that operate on pre-prepared software. The problem is that none of these programs have human sense and intelligence and people may manipulate them.
5. **Relation with partners and customers:** This is a very important point. Traditionally there was a direct relationship with partners and customers, but now this relationship is of digital nature and

in most cases, there is no face-to-face relationship. So, the transaction is more like a fictional character. Although there is a reality behind it, this reality may be unimaginably manipulated.

6. Revenue recognition: This may be a problem that concerns most accountants and the researcher believes that accounting theory has not considered the mechanism of revenue recognition considering the current high-tech status. In the past, revenue recognition was performed based on specific circumstances, such that revenue could be realized in many cases, and the point of sale was an anchor that could be overlooked only in certain cases. But now, in the absence of security and due to intrusion into the company by others, the process of revenue verification turns into a questionable process.

According to Tom Arnold, e-commerce risks fall into two main categories:

1. Detectable risks: It means that with the presence of its experts, the company may be able to find and counteract some violations in its systems. The most well-known of these violations are:

Known viruses: With a proper security system, the company can detect and eliminate these known viruses.

Amateur Internet hackers: Hackers rely on some information and Internet access codes to infiltrate the company's system, and if there is more than one user in the company's system, the hacker may be able to track the login process and obtain the information from the system memory. Therefore, if the company uses a mechanism that periodically changes these codes and clears the memory of computers of its experts, it can limit violations.

2. Undetectable risks: It means that some violations may occur without prior notice, either due to their unprecedentedness or unawareness of the company. They can be due to the following reasons:

Unknown viruses: Despite the protection systems owned by the company to counteract viruses, there are still viruses that are not yet known to the system, which may be able to enter the system network and could not be detected until it is too late. They can incur significant damage. In 2000, an amateur invented the virus "I Love you", which was made financial damage that could not be enumerated at the time. The virus acted as a time bomb because it was activated at a specific date during the year. After identification of its workings, it was found that the only way to prevent it was to shut down the system completely on that date.

Highly experienced internet hackers: This is one of the biggest problems that companies face. Internet hackers are not always amateurs, some of them have higher levels of experience and skills than many professionals, which, in many cases, enable them to infiltrate without knowing the company's systems. They may commit the offense without being known.

Technological growth: Often, it may be difficult to keep up with the acceleration of Internet technology growth in general and e-commerce in particular, which makes the technology used by the company time-worn. The problem is unknown time limits.

Methodology

This is applied research in terms of purpose and a descriptive-analytical survey in terms of the data collection method. Kim et al. (2009) questionnaire was used to collect data. An ordinal scale was for the questionnaire. To use the questionnaire to collect the required data, its validity and reliability were first examined by SPSS. The validity of the test was confirmed by experts in the subject matter.

The study population is the warehouses of the Assaluyeh petrochemical industry. Due to the fact that the petrochemical industry warehouses are scattered in different cities of Iran, in this study, the population includes all 150 financial managers and senior managers of the 50 existing petrochemical companies in Assaluyeh in the second half of 2021. Due to the small population, no sampling was performed. For this purpose, 180 questionnaires were distributed, of which 144 were returned and, after the necessary analyzes, 136 questionnaires were accepted to be used in data analysis. SPSS v. 18 was used for statistical analysis of the data obtained from the questionnaires.

Hypotheses

Main hypothesis

There is a significant relationship between the qualitative characteristics of data extracted from accounting information systems and the use of e-commerce in the industry.

Sub-hypotheses

Sub-hypothesis 1: There is a significant relationship between the usefulness of data extracted from the accounting information system and e-commerce customer satisfaction in the industry.

Sub-hypothesis 2: There is a significant relationship between the effectiveness of data extracted from the accounting information system and e-commerce risk control in the industry.

Sub-hypothesis 3: There is a significant relationship between the quality of data extracted from the accounting information system and control of e-commerce costs in the industry.

Sub-hypothesis 4: There is a significant relationship between the reliability of data extracted from the accounting information system and e-commerce value chain management in the industry.

Sub-hypothesis 5: There is a significant relationship between the relevance of data extracted from the accounting information system and e-commerce partnership in the industry.

Sub-hypothesis 6: There is a significant relationship between the timeliness of data extracted from the accounting information system and e-commerce risk-taking in the industry.

Sub-hypothesis 7: There is a significant relationship between the comparability of data extracted from the accounting information system and the continuity of e-commerce in the industry.

Findings

The present study aims at investigating the relationship between qualitative characteristics of data extracted from accounting information systems and e-commerce in the warehouses of Iran's petrochemical industry.

Main Hypothesis: There is a relationship between the qualitative characteristics of data extracted from accounting information systems and e-commerce in the warehouses of Iran's petrochemical industry.

H0: There is no relationship between the qualitative characteristics of the data extracted from the accounting information system and e-commerce.

H1: There is a relationship between the qualitative characteristics of the data extracted from the accounting information system and e-commerce.

Table 1: Statistical test of the main hypothesis

Hypothesis	T statistic	Significance level
Main hypothesis	-3.098	0.003

According to Table (1), since the significance level of T (likelihood of the independent variable) is equal to 0.003 and this number is less than 5%, our hypothesis H0 is rejected at the confidence level of 95% and our hypothesis that there is a relationship between the qualitative characteristics of data extracted from accounting information systems and the usefulness of e-commerce in the Iranian petrochemical industry is accepted.

Sub-hypothesis 1: There is a relationship between the usefulness of data extracted from the accounting information system and e-commerce customer satisfaction in petrochemical warehouses.

H0: There is no relationship between the usefulness of data extracted from the accounting information system and the satisfaction of e-commerce customers.

H1: There is a relationship between the usefulness of data extracted from the accounting information system and the satisfaction of e-commerce customers.

Table 2: Statistical test of sub-hypothesis 1

Hypothesis	T statistic	Significance level
Sub-hypothesis 1	-1.596	0.113

According to Table (2), since the significance level of T statistic is equal to 0.113, the H0 hypothesis is accepted at the confidence level of 95% and our hypothesis that there is a relationship between the data extracted from the accounting information system and the satisfaction of e-commerce customers in the warehouses of Iran's petrochemical industry is rejected.

Sub-hypothesis 2: There is a relationship between the effectiveness of data extracted from the accounting information system and e-commerce risk control in the warehouses of Iran's petrochemical industry.

H0: There is no relationship between the effectiveness of data extracted from the accounting information system and e-commerce risk control.

H1: There is a relationship between the effectiveness of data extracted from the accounting information system and e-commerce risk control.

Table 3: Statistical test of sub-hypothesis 2

Hypothesis	T statistic	Significance level
Sub-hypothesis 2	3.964	0.000

According to Table (3), the significance level of T (likelihood of independent variable) is equal to 0.000. Therefore, the H0 hypothesis is rejected at the confidence level of 95% and our hypothesis that there is a relationship between the effectiveness of the data extracted from the accounting information system and e-commerce risk control is accepted.

Sub-hypothesis 3: There is a relationship between the quality of data extracted from the accounting information system and control of e-commerce costs in petrochemical warehouses.

H0: There is no relationship between the quality of data extracted from the accounting information system and e-commerce cost control.

H1: There is a relationship between the quality of data extracted from the accounting information system and e-commerce cost control.

Table 4: Statistical test of sub-hypothesis 3

Hypothesis	T statistic	Significance level
Sub-hypothesis 3	-2.035	0.045

According to Table (4), since the probability of the independent variable is 0.045, there is a relationship between the independent and dependent variables at the confidence level of 95%. Therefore, our H0 is rejected and our hypothesis that there is a relationship between the quality of data extracted from the accounting information system and control of e-commerce costs in the warehouses of Iran's petrochemical industry is accepted.

Sub-hypothesis 4: There is a relationship between the reliability of data extracted from the accounting information system and e-commerce value chain management in the warehouses of Iran's petrochemical industry.

H0: There is no relationship between the reliability of data extracted from the accounting information system and e-commerce value chain management.

H1: There is a relationship between the reliability of data extracted from the accounting information system and e-commerce value chain management.

Table 5: Statistical test of sub-hypothesis 4

Hypothesis	T statistic	Significance level
Sub-hypothesis 4	493/0-	0.614

According to Table (5), considering that the value of T statistic is equal to 0.614 at the confidence level of 95% and that this number is more than 0.05, we accept the H0 hypothesis and our hypothesis that there is a relationship between the reliability of the data extracted from the Accounting information system and e-commerce value chain management in the warehouses of Iran's petrochemical industry is rejected.

Sub-hypothesis 5: There is a significant relationship between the relevance of data extracted from the accounting information system and e-commerce partnership in the warehouses of Iran's petrochemical industry.

H0: There is no relationship between the relevance of data extracted from the accounting information system and the e-commerce partnership.

H1: There is a relationship between the relevance of data extracted from the accounting information system and the e-commerce partnership.

Table 6: Statistical test of sub-hypothesis 5

Hypothesis	T statistic	Significance level
Sub-hypothesis 5	-10.497	0.000

According to Table (6), the probability of the independent variable is equal to 0.000. As a result, the H0 is rejected and our hypothesis that there is a relationship between the relevance of data extracted from the accounting information system and e-commerce partnership in the warehouses of Iran's petrochemical industry is accepted.

Sub-hypothesis 6: There is a relationship between the timeliness of data extracted from the accounting information system and e-commerce risk-taking in the warehouses of Iran's petrochemical industry.

H0: There is no relationship between timely data extracted from accounting information systems and e-commerce risk-taking.

H1: There is a relationship between timely data extracted from accounting information systems and e-commerce risk-taking.

Table 7: Statistical test of sub-hypothesis 6

Hypothesis	T statistic	Significance level
Sub-hypothesis 6	-2.931	0.002

According to Table (7), the significance level of the statistic is equal to 0.002 at a confidence level of 95%, so the H0 is rejected and of our hypothesis on the relationship between timely data extracted from the accounting information system and risk-taking in e-commerce in the warehouses of Iran's petrochemical industry is accepted.

Sub-hypothesis 7: There is a relationship between comparable data extracted from the accounting information system and the continuation of e-commerce in the warehouses of the Iranian petrochemical industry.

H0: There is no relationship between the comparability of data extracted from the accounting information system and the continuation of e-commerce.

H1: There is a relationship between the comparability of data extracted from the accounting information system and the continuation of e-commerce.

Table 8: Statistical test of sub-hypothesis 7

Hypothesis	T statistic	Significance level
Sub-hypothesis 7	12.591	0.001

According to Table (8), the probability of the independent variable is equal to 0.001, and since this value is lower than 0.05, the H_0 is rejected and our hypothesis that there is a relationship between comparability of data extracted from the accounting information system and continuation of e-commerce in Iranian petrochemical warehouses is accepted at the confidence level of 95%.

Conclusion

Warehouses of the petrochemical industry use their websites to introduce their products and services to customers. This has made customers from all over the world become familiar with the products of the petrochemical industry. It is considered in planning to achieve the objectives of information systems. One of the systems used to process data is the accounting information system. The present study seeks to examine the relationship between qualitative characteristics of data extracted from accounting information systems and e-commerce in warehouses of the Iranian petrochemical industry. For this purpose, the parameters of the qualitative characteristics of data extracted from the accounting information system were considered, and finally, it was concluded that there is a relationship between the qualitative characteristics of data extracted from the accounting information systems and e-commerce in the warehouses of Iran's petrochemical industries. Also, there is a statistically significant relationship between the effectiveness, quality, timeliness, and comparability of data extracted from the accounting information system and risk control in e-commerce. On the other hand, there is no statistically significant relationship between the usability and reliability of data extracted from the accounting information system and the satisfaction of e-commerce customers. According to this concept and theoretical foundations, it is not far from expectations. Also, since no studies have been made not only in Iran but also in other countries, no comparison could be made with similar studies.

In this study, data were collected from employees and staff in the organization and it is recommended that in future studies, other groups such as auditors, creditors, etc are also interviewed. Also, since this study has been performed in the petrochemical industry, future studies should be performed in other industries. On the other hand, this study was carried out in the Assaluoy petrochemical industry. So, in further studies, other cities such as Mahshahr, Shiraz, Tehran, Isfahan, Mashhad, etc. should also be evaluated.

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