

Examination of the Factors Affecting Accounting Information Systems in Reaching Security, Assurance, and Reliability in the Light of E-Commerce (Case Study: Assaluyeh Petrochemical Industry)

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Abstract In spite of the many investments in information technology (IT) applications in the industry, the reports show that some users do not use it despite the access to accounting technologies and information systems. Here, perceived reliability, confidence, and security are the key components that affect the use of these systems. Hence, the purpose of the present study was to determine the effect of objective aspects, such as electronic data exchange processes, technical protections, and security statements on using accounting information systems and the exploitation of the three mental aspects of security, assurance, and perceived reliability among the customers of Assaluyeh petrochemicals. The method nature was survey-applied. The study data was collected using a survey of petrochemical customers in Assaluyeh through a questionnaire. Structural validity was studied using confirmatory factor analysis with Cronbach's alpha coefficient greater than 0.7 for the various constructs of the questionnaire confirming the assurance. Statistical data analysis was done in warp pls software and spss 18 software. The findings indicated that the structural model of the study had sufficient predictive power. In other words, 43.7% of the variance of the perceived security was explained by the variables entered, 30.4% of the changes in perceived reliability by the variable entering it in the model (objective aspects and perceived security) as well as 25.9% of the changes in using the accounting information system by two variables (assurance and reliability) and perceived security.

Keywords: Electronic commerce, security, perceived assurance, reliability, accounting information systems

Introduction

The globalization age has led to many changes in different aspects of life and the countries of the world compete with each other to enter the world markets through the widest gates, as everyone tries to find the best and easiest ways to enter this new world order in various types. The ways that make the world look more like a single village. With its modern, advanced, accelerating, variable, and numerous forms, Information technology (IT) has made anyone who wants to enter the new world order study and create materials and mechanisms that help them in this competition.

Recently, the companies have begun using so-called electronic commerce (e-commerce) services through the Internet, which is because this electronic network rapidly attacks all countries of the world using which companies can market and sell their products. Moreover, it reaches the consumer at a low cost everywhere and one can state that this network has abolished the borders between the states. Many companies in this magical network create a website now for them called (Web Page) by which they market their products and given the restrictions, rules, and the links designed by the site owner company, the customer can complete the purchase process using credit cards and in-account purchases.

However, despite the advantages of the Internet, some drawbacks and restrictions are very dangerous for the accounting information system, affecting its effectiveness and efficiency, and the most important of these factors are security - some technological measures that prevent others from infiltrating the automated accounting system through the company's website. Assurance means professional services that enhance the quality of information or interventions desired by decision-makers. Reliability is the procedures that have to be followed to ensure information is provided by stakeholders in general and decision-makers in particular and convinces them of effectiveness.

Without access to the three items stated above, the accounting system becomes completely sterile and its effectiveness and efficiency become doubtful, and in the worst case, it may end in the complete collapse of the company. Thus, companies try to avoid these negative points or limitations in various manners, but the question begged here is "how?"

The study will try to answer this significant question by studying, research, and analyzing in-depth e-commerce, and how it associates with accounting information systems and try to reach the development of a model for a system as the link between the accounting information system and e-commerce. Moreover, through the development of this model, it will try to provide precise control mechanisms by which the three negative (safety, assurance, and reliability) lacks could be avoided.

Here, it has to be noted that many companies are afraid to use e-commerce because of the risks associated with it, especially the possibility of hackers infiltrating their accounting systems. Thus, this mediocre study could help those companies find a special mechanism to reduce this risk and obsession, especially Iranian companies must keep up with the world in introducing their business as part of their future strategies if they want to survive and compete in a globalized world. Accordingly, the purpose of the study is to examine the factors that affect accounting information systems in achieving security, assurance, and reliability in the light of e-commerce (Case study: Assaluyeh Petrochemical Industry).

Theoretical foundations

Accounting information systems

Like other sciences, accounting is ruled by its system, which is composed of three main parts: input, processing, and output. Like any other system, it is governed by several strict policies and procedures that may not be violated for any reason regardless of whether it is a computer system or not.

The three main things that help the automated accounting system reach the quality of information are as follows. Security is a proposal for specific technology measures that prevent others from infiltrating the automated accounting system through the company's website on the Internet. Assurance refers to the mechanisms and procedures that have to be adhered to for ensuring the good quality of information. The American Institute of Certified Public Accountants (AICPA) has defined them on its website as verification services that are professional services providing quality information or interventions intended that improve the decision-makers' opinion."¹ Reliability is about the procedures that need to be followed to make information reliable to stakeholders in general and decision-makers in particular and to convince them of its effectiveness.

Many international accounting institutions and some reputable universities have shown interest in e-commerce and have made the mechanism for controlling the accounting operations conducted by it as the core of the competence of accounting and auditing science, and at the top of these institutions is AICPA, which approved five audit principles for e-commerce websites for companies in its joint project with the Canadian Institute of Certified Public Accountants (CICA), be discussed at the end of the study.

¹ Assurance Services, The Opportunity that Exists for the Profession, (AICPA Web Site), <https://aicpa.org/assurance>

In his paper entitled “E-Commerce in the Journal of Information Technology Auditing,” Albert Marcella explains the effect that e-commerce has had on the accounting and auditing profession, stating that this modern technology has created and changed each of the following elements: accountant and auditor performance, technique, skills and information, the necessary information that both the accountant and the auditor have to be surrounded by, the accountant and auditor obligations, and finally the type of services provided by the accountant and auditor.

Jamous (1991) did a review of computer-based accounting systems. The study was aimed at introducing automated accounting information systems and their audit process with a focus on using computers as the main tool for the audit process. The findings indicated that the audit process followed by the auditors of the Central Financial Supervision Agency in Syria does not reach a reasonable level of progress in using computers. Furthermore, there was a lack of integrated computer components in most of the examined sample companies. All the computer equipment belonging to the sample companies examined is technically obsolete and cannot be economically viable. Using computer equipment in the sample companies examined is limited to performing very simple mathematical operations including calculating workers' wages.

Al-Issa (2000) studied the role of information systems in administrative decisions in the Ministry of Education. The study aimed at examining the role of information systems in administrative decisions in the Ministry of Education in Jordan to better understand the role of information systems in decision-making in the ministry and to identify the comprehensiveness of information systems as well as to identify weaknesses in the information systems used in the ministry and thus develop these systems and increase their efficiency. This study revealed a positive relationship between the role of information systems and administrative decision-making in the Ministry of Education. Moreover, there is a positive relationship between the type of devices used in information systems and decision-making.

E-commerce

One can state that the term e-commerce simply put refers to the use of the Internet and the World Wide Web to exchange operations in its different types between various businesses with a focus on the use of digital technology in business operations between companies and individuals.² Moreover, some have defined it as “Business transactions realized by individuals and agencies that rely on the processing and transmission of digital data such as audio and video, over open networks such as the Internet or closed that allow access to open networks” (Zairi and Delobashi, 2002). All accounting and auditing institutions and associations interested in accounting science pay a lot of attention to e-commerce. Accordingly, as the sales process that is done through the company's website is closely and directly associated with the automated accounting system, the auditor and accounting familiarity with this new knowledge becomes essential. In his paper entitled “E-commerce in the Journal of Information Technology Auditing,” Albert Marcella stated that e-commerce has brought about major changes in the science of global commerce and the mechanism of business operations. This makes the accountant and the auditor familiar with these changes and their effect on their profession, on the work they do, and on the legal environment of the profession (Albert Marcella, 1998).

It is noteworthy that e-commerce and the Internet can contribute to the quality of information by providing the convenience feature extensively, particularly by providing the proper timing sub-feature. The researcher argues that the accounting system, with the very important information that it provides to stakeholders in general and decision-makers in particular, becomes useless if the information provided is not reliable and as the e-commerce system is connected to the Internet. In case of malfunction or breach

² Kenneth c. Laudon & Carol Guericio, Ibid., P. (7)

of the accounting system via the Internet, as it is directly connected with the automated accounting system, the outputs of the accounting system are questioned and thus the user assurance is lost.

A few empirical studies have investigated the direct relationship between perceived customer security and perceived customer reliability in the accounting information system. Among the few studies in this regard are the ones conducted by Chelapa and Paulo (2002). According to the study, they concluded that online exchanges are exposed to different threats and that customers' reliability in online exchanges is affected by their perception of security. The results of their study showed a positive and significant relationship between customers' perception of security in online exchanges and their reliability. Theodosius and George (2005) argue that e-data exchange service providers have to consider security and reliability as very important factors in the accounting information system.

Empirical studies on security discussions that are based on customer perspectives are problematic as the theoretical concepts of security are highly abstract. To tackle this problem, a study was conducted using the framework and model of Ling et al. (2006). They concentrated on the issue of security, affecting customers' participation in mobile payments, and categorized the concept of security into two aspects: objective security and subjective security. Accordingly, both subjective and objective aspects of security have been used in the present research model. In the objective aspect, security indices like accurate accounting information system solutions are examined in detail that respond to all security concerns such as technical protections, exchange procedures, and security terms. Customer subjective evaluation of security does not affect objective security indices, whereas the level of objective security indices affects customer subjective assessments.

The study examines the research model of using accounting information systems affected by the security and reliability perceived by customers. If an accounting information system does not bring about a sufficiently secure environment for trading, customers will be skeptical of the system, which might reduce customer reliability and ultimately reduce their use of the system (Gan et al., 2003; Link et al., 2006). Given the points stated above, Figure (1) is the conceptual model of the study that is adapted from the research by Kim et al. (2009).

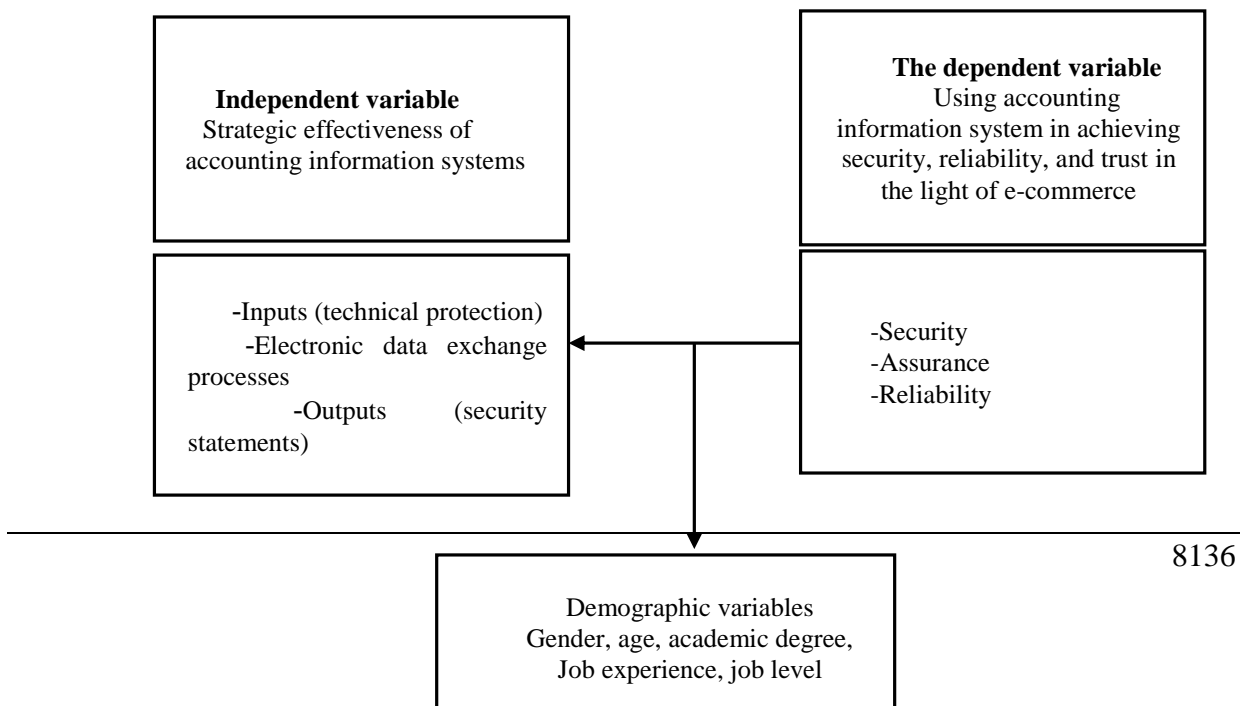


Figure 1. The conceptual model of the factors affecting accounting information systems in reaching security, assurance, and reliability in the light of e-commerce

Methodology

The study was applied in terms of purpose; thus, the applied aspect of the study shows that the results can be used to provide suggestions to petrochemical industry managers to increase and enhance the security and reliability of accounting systems. Moreover, the study was descriptive survey-analytical considering the data collection method. Kim et al. (2009) questionnaire was used to collect data. The scale used in the questionnaire was a rank scale. Its validity and assurance were first checked by SPSS software to use the questionnaire to collect the required information. The validity analysis of the test was performed and approved by subject matter experts.

The study population was the warehouses of the Assaluyeh petrochemical industry. As the petrochemical industry warehouses are widespread and scattered in various cities of Iran, the population was the financial managers and senior managers of all 50 petrochemicals in Assaluyeh from March to August 2021, whose number was estimated at 150 people and no sampling was performed because of the limited number of populations. To this end, 180 questionnaires were provided to the population, of which 144 were returned and finally 136 questionnaires were accepted to be used in data analysis after the necessary studies. Cochran's formula for unknown populations was used to estimate the sample size.

$$n = \left(\frac{Z_{\alpha/2} \times \delta}{\varepsilon} \right)^2 = \left(\frac{1.96 \times 0.667}{0.072} \right)^2 = 329.68 \sim 330$$

A simple random sampling method was used to select the samples considering the information available, where there is no specific classification of the population. On the other hand, because of the non-return of some questionnaires, 370 questionnaires were distributed proportionally among e-service customers in Assaluyeh petrochemical branches, of which 336 questionnaires were completed and returned. Warp pls software and SPSS 18 software were used for the statistical analysis of the data obtained from the questionnaires of this study.

Results

In this section, the results obtained from SPSS software concerning the validity and assurance of the research tool are presented. In this section, first, the validity and reliability are examined. Factor analysis was used to evaluate the validity of the construct. In performing factor analysis, one has to firstly ensure

that the available data can be used for analysis. In other words, is the amount of data appropriate for factor analysis or not? KMO index and Bartlett's Test are used for this purpose.

The results of the validity of the tool are presented in Table (1). As is seen in the table, the value of the KMO index for all variables was higher than 0.5 and thus acceptable. On the other hand, the Bartlett test is significant for factor analysis of all variables. Thus, one can state that the sample has sufficient adequacy. The extracted values were calculated for the items of each variable, and as this value was less than 0.3 for the items of some variables, these items were excluded from the analysis. These values are shown in Table (1). The items whose extracted values are less than 0.3 are highlighted.

Table 1. The results of the validity of the variables

Variable	Items	KMO sampling adequacy criterion	X ² approximate value	Degree of freedom	Significance of Bartlett test	The values extracted
Perceived security	1	0.641	430.719	21	0.000	0.567
	2					0.194
	3					0.351
	4					0.114
	5					0.457
	6					0.494
	7					0.230
Perceived assurance and reliability	8	0.78	455.255	36	0.000	0.343
	9					0.644
	10					0.558
	11					0.003
	12					0.038
	13					0.339
	14					0.099
	15					0.014
	16					0.373
Data exchange processes	17	0.668	144.239	15	0.000	0.383
	18					0.351
	19					0.413
	20					0.554
	21					0.106
	22					0.172

Technical protection	23	0.601	350.560	21	0.000	0.310
	24					0.490
	25					0.390
	26					0.185
	27					0.211
	28					0.357
	29					0.363
Security statements	30	0.749	338.776	15	0.000	0.548
	31					0.554
	32					0.388
	33					0.606
	34					0.354
	35					0.063
Using accounting information system	36	0.611	47.265	3	0.000	0.654

Reliability was evaluated using Cronbach's alpha coefficient. In this section, the value of the coefficient obtained for the variables is presented in the table below. The calculated Cronbach's alpha value for all variables was higher than 0.7. Thus, one can conclude that the research tool has good reliability.

Table 2. Cronbach's alpha coefficient of the variables

Variables	The number items	Cronbach's alpha coefficient
Perceived security	4	0.74
Perceived assurance and reliability	5	0.88
Data exchange processes	4	0.84
Technical protections	5	0.75
Security statements	5	0.91
Using an accounting information system	3	0.821

After ensuring the validity and reliability of the tool, the conceptual model of the study was fitted in warp pls software and the following structural equation model was obtained:

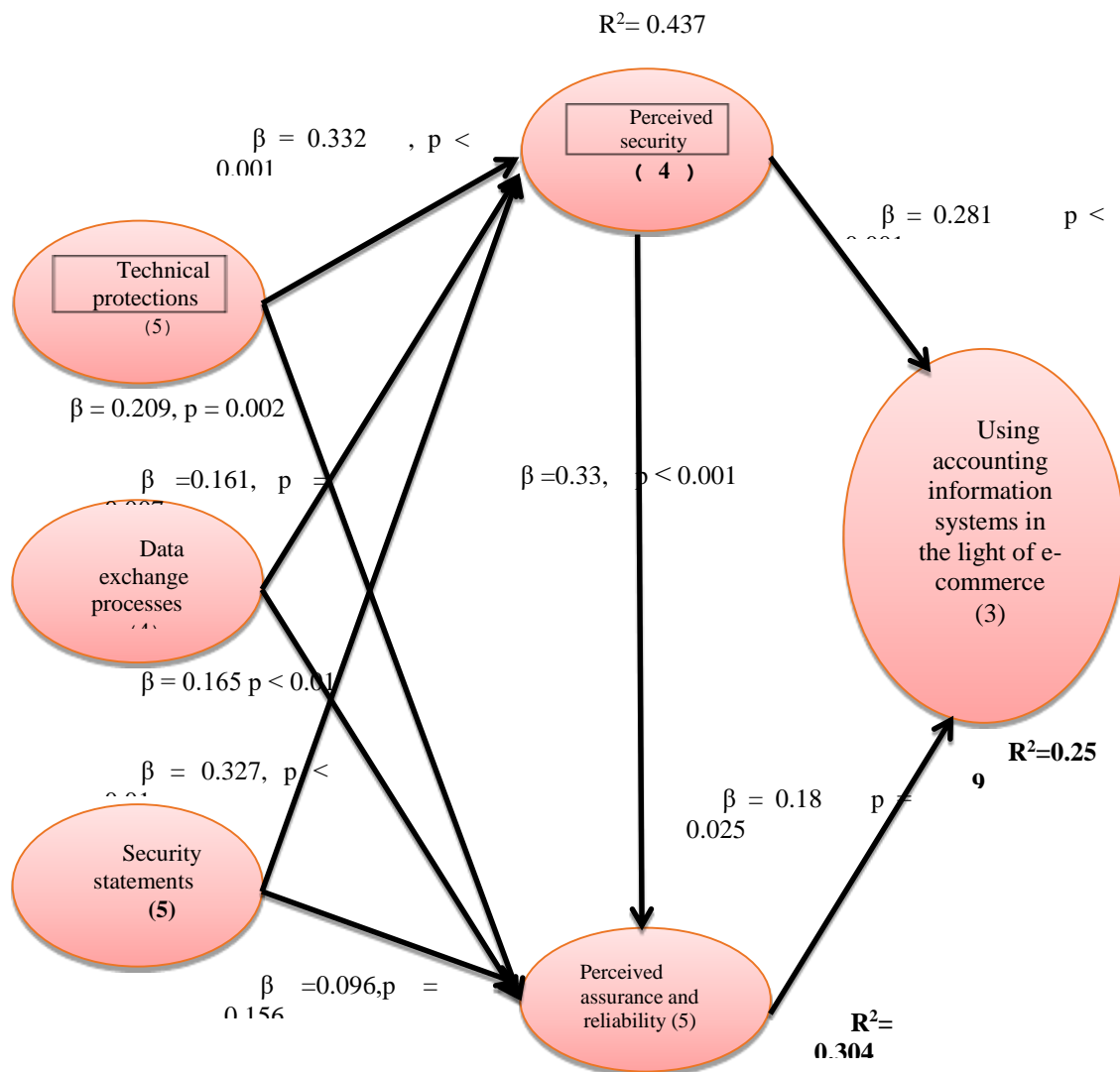


Figure 2. Fitted conceptual model

The reliability of each of the latent variable markers in the PLS model is determined by the value of factor loadings of each marker. The value of each of the factor loadings of the relevant latent variables must be greater than or equal to 0.5 (Falkner & Miller, 2010). The table below shows the value of factor loadings for the markers of the variables.

Table 3. Value of factor loadings of the latent variables

Latent variables Markers	Perceived security	Perceived assurance and reliability	Data exchange processes	Technical protections	Security statements	Using an accounting information system	P values
Item 1	0.548	-	-	-	-	-	<0.001
Item 2	0.563	-	-	-	-	-	<0.001
Item 3	0.720	-	-	-	-	-	0.031
Item 4	0.768	-	-	-	-	-	<0.001
Item 5	-	0.614	-	-	-	-	<0.001
Item 6	-	0.728	-	-	-	-	<0.001
Item 7	-	0.788	-	-	-	-	0.006
Item 8	-	0.564	-	-	-	-	<0.001
Item 9	-	0.543	-	-	-	-	<0.001
Item 10	-	-	0.600	-	-	-	<0.001
Item 11	-	-	0.528	-	-	-	<0.001
Item 12	-	-	0.666	-	-	-	<0.001
Item 13	-	-	0.750	-	-	-	<0.001
Item 14	-	-	-	0.660	-	-	<0.001
Item 15	-	-	-	0.703	-	-	<0.001
Item 16	-	-	-	0.572	-	-	<0.001
Item 17	-	-	-	0.564	-	-	<0.001
Item 18	-	-	-	0.727	-	-	<0.001
Item 19	-	-	-	-	0.731	-	<0.001
Item 20	-	-	-	-	0.752	-	<0.001
Item 21	-	-	-	-	0.659	-	<0.001

Latent variables Markers	Perceived security	Perceived assurance and reliability	Data exchange processes	Technical protections	Security statements	Using an accounting information system	P values
Item 22	-	-	-	-	0.784	-	<0.001
Item 23	-	-	-	-	0.578	-	<0.001
Item 24	-	-	-	-	-	0.808	<0.001
Item 25	-	-	-	-	-	0.811	<0.001
Item 26	-	-	-	-	-	0.572	<0.001

As is seen in the table above, all values of the metrics associated with the latent variable highlighted are higher than 0.5. Hence, one can state that the measurement model has enough reliability regarding the markers of latent variables.

To prove that the questionnaire has convergent validity, the first point is that the probability values should be less than 0.05 and the second is that the values of the relevant factor loadings should be greater than or equal to 0.5. As is seen in Table (3), both criteria have been met for the present research tool and the questionnaire has appropriate convergent validity.

Table (4) is the path coefficients between different constructs. These coefficients show the strength of the perceived relationships between the two constructs.

Table 4. Path coefficients

Indices	Path coefficient (β)	p-value
Internal model relationships		
Technical protection → Perceived security	0.332	<0.001
Technical protection → Perceived assurance and reliability	0.209	<0.002
Data exchange processes → Perceived security	0.161	<0.007
Perceived data exchange processes → Perceived assurance and reliability	0.165	<0.001
Security statements → Perceived security	0.327	<0.001
Security statements → Perceived assurance and reliability	0.096	0.151
Perceived security → Perceived assurance and reliability	0.330	<0.001
Perceived security → using accounting information system	0.281	<0.001
Perceived reliability → using accounting information system	0.185	0.025

In the present study, according to the values in Table (4), one can conclude that the structural model of the study has enough predictive power. In other words, 43.7% of the variance of the perceived security variable is explained by the variables entering the model (objective aspects). Moreover, 30.4% of the changes in perceived reliability are explained by the variable entering the model (objective aspects and

perceived security) and 25.9% of the changes of using the accounting information system by two variables (assurance and reliability) and perceived security.

Table 5. Explanation of the variance of dependent variables

Index Dependent variables	R ²
Perceived security	0.437
Assurance, perceived reliability	0.304
Using an accounting information system	0.259

Given the contents of the structural model analysis, it is seen that all the indices examined had the necessary conditions and thus the model proposed has sufficient predictive power.

Conclusion

The study was an effort to discover and identify e-commerce and clarify its close relationship with accounting and auditing professions, how they affect the new business environment, show the problems associated with them and try to reach a model linking the company's accounting system and the website and solve their problems. It is on the internet; It also solves problems with them. The results indicated that e-commerce as highly advanced technology has specifically affected all professional fields, especially accounting and auditing professions. E-commerce operates in a unique environment as all operations through which intangible operations are performed lack a validation mechanism at most stages. The intangible nature of e-commerce and the lack of documentation associated with its performance have directly contributed to two major problems the accounting and auditing professions face, one is the mechanism for verifying and identifying revenue from e-commerce operations and the other is the mechanism for allocating sales and income taxes from e-commerce.

Moreover, to face the new environment and problems associated with e-commerce, some accounting and auditing institutions have been informed about the problems of e-commerce and the need to qualify their affiliated companies with technical techniques. Accounting theory and its current form have not managed to deal with the mechanism of verification and identification of revenues from e-commerce operations. On the other hand, it is possible to solve many problems associated with e-commerce in general and the problems of revenue recognition and tax allocation in particular if one can provide practical policies and procedures to reach security, assurance, and reliability in the outputs of an accounting system that deals with e-commerce. Ensuring security, assurance and reliability are audited only through the creation and development of a communication system between the company accounting system and its website on the internet within the framework of technical and accounting policies and procedures adopted by the company, which in terms of accounting and technology by an external qualified organization.

According to the results, it is recommended that the model of the communication system between the company accounting system and its website on the Internet be developed by companies using e-commerce technology. This is to enable them to face the many problems that come with it. Furthermore, hiring an auditor with technical competence to audit the company's accounting system policies and procedures

related to e-commerce is recommended. Additionally, qualifying accountants and auditors and training them on IT in general and e-commerce contracts, in particular, is recommended.

The need to rebuild education systems at all levels of the accounting and auditing professions so that familiarity with information technology in general and e-commerce, in particular, are among the principles of awarding scientific and practical certifications and practicing this profession accounting and updating its concepts in accordance with the new business environment provided by the e-commerce environment. There is a need to review international accounting standards and develop them in line with the changes that e-commerce has created. There is also a need for the governments to be aware to look for or to participate in creating international law governing the sale and purchase of e-commerce to be considered.

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