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Expert Systems as an Artificial Intelligence Technique for Enhancing Financial Reporting Quality

Evidence from Faculty Members at the University of Kufa and Warith Al-Anbiyaa University

Asst. Lect. Fawziah Hussein Al-Hlaly

University of the Warith AL-Anbiyaa, Karbala, Iraq fawziah.al-helaly@uowa.edu.iq

Abstract

Research objective: The aim of this paper was to discuss how expert systems may be used as an artificial artificial intelligence in enhancing quality of financial reports. It has addressed their implications on the qualitative nature of financial information that are the relevance, truthfulness features, and supportive features.

Research problem: The research problem can be formulated in the following question "To what extent does the adoption of expert systems as an artificial intelligence technique affect the quality of financial reporting in terms of its qualitative characteristics within the Iraqi academic environment?"

Research hypotheses: The study is based on the main hypothesis that:

H1: There is a statistically significant positive impact of expert systems on the quality of financial reporting, and the following hypotheses are derived from it:

H1-1: There is a statistically significant positive impact of expert systems on the relevance of financial information.

H1-2: There is a statistically significant positive impact of expert systems on the faithful representation of financial information.

H1-3: There is a statistically significant positive impact of expert systems on the enhancing qualitative characteristics of financial reporting (such as comparability, timeliness, understandability, and reliability).

Research methods: The analytical approach and major method of data collection applied in this study was the questionnaire. The sample was 133 accounting professors in the Universities of Kufa and Warith Al-Anbiya and 112 of them were returned, and this became considered valid to perform statistical analysis with a response rate of about 84.2. The result of the statistical study was to demonstrate that the positive impact of applying expert systems on the enhancement of the quality of the financial reports was statistically significant. In this regard, this influence was more significant on increasing relevance of financial information, which is more truthful and increases other attributes of financial information support, such as comparability, timeliness and level of confidence. The study has concluded that the application of expert systems is useful in supporting the accuracy and reliability of the financial reports and increasing its ability to assist decision-makers

in the academic and accounting setting. The study recommended the adoption of expert systems technologies in accounting systems and the development of new capabilities of academic and accounting personnel in the sphere of the application of artificial intelligence to enhance the quality of financial reports and the needs of the digital transformation. Keywords: The expert systems, artificial intelligence technologies, quality of financial report, professors in the University of Kufa and the Warith Al-Anbiya University, The researcher used statistical software (SPSS) to analyze the data.

Keywords: Expert system, artificial intelligence technologies, quality of financial reporting, professors in the University of Kufa and Warith Al-Anbiya University.

1. Introduction

The blistering development of Artificial Intelligence (AI) technologies has significantly changed the modern accounting practice, especially the preparation and distribution of financial reports. The digital transformation has changed the accounting systems that initially were a traditional data-recording tool to an intelligent decision support platform that can process complex financial data with more accuracy, speed, and consistency [1]. Since organizations are under more and more pressure to deliver transparent, reliable and timely financial information, the weaknesses of traditional accounting systems are becoming clearer than ever, particularly when operating in a high data, regulatory complexity environment [2].Expert system is one of the oldest and most powerful forms of smart technologies applied in accounting. Expert systems refer to knowledge based systems that

attempt to establish the human expertise by way of inference engines and organized knowledge bases, which help in resolving complex problems and in decision-making [3]. Financial reporting, auditing, detecting fraud, and internal control are some of the areas that the accounting context has been implemented and have enhanced consistency and minimized wrongful use [4]. They increase the analytical ability and improve the accuracy of accounting outputs through integration in accounting processes [5].The quality of financial reporting has been one of the main pillars of accounting studies because financial reporting has been the main channel of communication between the organization and the stakeholders. Quality financial reports are known to have the following characteristics, which are qualitative in nature and which include relevance, faithful representation, comparability, understandability and timeliness [6]. The features make users have more confidence in financial information and make economic and managerial decisions more effective [7]. Nevertheless, it is quite difficult to attain such quality standards in practice especially in developing economies where in many cases the accounting system may be technologically and organizationally constrained 8
Recent research indicates that AI-based accounting systems such as expert systems are important in improving the qualitative nature of financial information. The expert systems help to increase accuracy and reliability of the financial reports by automating routine accounting operations, validating information and using consistent rules of reasoning [9]. Additionally, smart systems allow real-time processing of financial information hence enhancing the predictive usefulness and timeliness of accounting information [10]. These gains are especially high in knowledge intensive

settings where decision-makers are strongly dependant on quality financial reporting [11].

Although the literature on the adoption of AI in accounting is on the increase, the quality of financial reporting remains the most popular outcome variable which has not been directly studied by the existing literature concerning the adoption of AI in accounting. Moreover, majority of the empirical studies have been elicited out of developed economies that have advanced digital systems, hence a significant research gap still exists in the use and effects of expert systems in the academic and professional accounting setting in the developing world [12]. In Iraq, there is limited empirical research studies on the importance of expert system in improving the quality of financial reporting especially on the side of the accounting academicians who are key in developing the accounting knowledge and practice.To fill this gap, the present study explores the concept of expert systems as one of the most widely used AI methods and the role of expert systems in improving the quality of financial reporting, in terms of relevance, true representation, and increasing the qualitative attributes. The research, which is a perceptions-based empirical study carried out among the accounting professors of the University of Kufa and the University of Warith Al-Anbiyaa, is relevant to the theoretical and practical discourse of AI-powered accounting innovation. Particularly, it presents empirical results of a developing-country setting and offers the insinuations of how knowledge systems can facilitate better-quality financial reporting in keeping with worldwide accounting statutes and digital transformation plans.

2. Theoretical Framework & Literature Review

2.1 Expert Systems as an Artificial Intelligence Technique

One of the most established and influential applications of artificial intelligence in the organizational and accounting environment is expert systems. They can be considered as knowledge-based information systems that reproduce the problem-solving abilities of the human experts, by utilizing the processed knowledge bases and inference engines [13]. Expert systems, unlike the traditional information systems that are more concerned with the data processing and storage, place greater attention on reasoning, judgment, and advisory support and are therefore more applicable in the complex decision-making scenarios including accounting and financial reporting [14].

The expert systems have a theoretical basis on the fact that they have the capacity to simulate the human expertise whereby the expert knowledge is captured in terms of rules, facts and logical relationships. This modeling provides the system to duplicate the thought of the experts in analyzing circumstances, diagnosing issues, or in coming up with recommendations [15]. As a result, expert systems are not only sources of information but they also aid in thinking, by managers, improving the depth of analysis and avoiding the reliance on experience.

Functionally, expert systems can be described to have a number of major elements:

A. **Knowledge Base**: Stores knowledge that has been gained by experts, standards of accounting, rules of decision making and best practices.

B. **Inference Engine**: This engine uses logical reasoning mechanisms on the knowledge base to make conclusions and recommendations.

C. **Explain Facility:** Provides users with insight into the derivation of decisions or recommendations, and this increases transparency and trust.

D. **User Interface**: The interface allows system-decision maker interaction enabling it to be effectively used in an organizational environment [13][15].

Expert systems have found broad application in the field of accounting where they have been applied in financial reporting, auditing, internal control, and fraud detection [14]. They add accuracy, consistency and objectivity to accounting systems, especially in an environment with substantial quantities of data and complicated regulatory mandates. Expert systems minimize the number of human errors and personal bias, which are the most significant pitfalls in manual accounting systems by standardizing accounting treatments and rules of reasoning [15][10].

In addition, expert systems are involved in organizational learning because they facilitate acquisition and sharing of accounting knowledge to various levels of management. They not only help the top management to offer solutions but to think strategically and carry out analysis of a scenario thereby enhancing the quality of managerial decisions made [13]. Such systems are also important in academic accounting settings in supporting teaching, research and professional judgment thus enhancing the connection between theory and practice.

It has been stressed by recent literature on accounting that the implementation of expert systems into accounting information system constitutes a radical change towards the direction of intelligent accounting where decision support and qualitative enhancement of outputs become the key goals [14][15]. This change is quite parallel with the digital transformation programs and the rising need of quality financial information that can enable informed decision-making.

2.2 Financial Reporting Quality

The quality of financial reporting has been one of the fundamental concepts in accounting theory and practice because financial reporting is the major tool that enables organizations to communicate their financial performance and position to stakeholders. Good financial reporting leads to better transparency, accountability and confidence of financial information, which contributes to effective economic and managerial decision making [16][17].

As is stated in accounting literature and international accounting standards, the quality of financial reporting is not determined by the amount of the disclosed information, but by the qualitative nature of such information that renders it to be useful to the users [16]. These properties make the financial information a true reflection of economic reality that can be efficiently used by investors, managers, regulators, and other stakeholders [18].

The three main dimensions in this study to investigate the financial reporting quality mirror the previous studies and idea bases:

2.2.1 Relevance

Relevance is defined as the capacity of financial information to impact the decision of the users by giving them significant values

about the financial performance and the future outlook of an entity [16]. Relevant financial information has a predictive value, a confirmatory value or both and is said to be material when omission or misstatement may impact the outcome of decision making [17].

In the real world, relevance makes the financial reports useful in helping the users to analyze the previous, analyze present events and predict future output. Nonetheless, relevance is still a problem in the settings where accounting systems are either not technologically advanced or are not equipped with data processing facilities that would allow them to act timely [18].

Relevancy is also boosted by the fact that expert systems are able to offer real-time data processing, proper classification of financial transactions and provide information that is relevant to make decisions in a timely manner. These systems guarantee that the financial data on the reports provided cases expert logic to directly serve the users in their analytical and forecasting requirements [15][10]**2.2.2 Faithful Representation**

Faithful representation can be termed as the level of accuracy of financial information in representing the underlying economic phenomena that it claims to be representing [16]. Information is said to be faithfully represented when it is complete, neutral and material free [17].This is a critical aspect in establishing credibility on financial reports because such bias, partial or misleading information destroys the credibility of the stakeholders and can result in suboptimal decisions. In conventional accounting systems, manual errors, subjective judgement or inconsistent enforcement of accounting standards tend to undermine faithful representation [18].Expert systems help in resolving these issues

by automating the validation procedures, using the standardized accounting rules and consistency throughout the periods of reporting. Expert systems promote neutrality and reliability of financial information by considerably greater means of systematic reasoning and error-checking mechanisms, and thus improve the faithful representation [14][15][10].

2.2.3 Enhancing Qualitative Characteristics

Existence of enhancing qualitative nature, which increases the overall usefulness of financial information, ought to be in addition to the relevance and faithful representation [16]. Such features are:

A. **Comparability**: It enables the comparisons of the financial information to be made, period to period, and entity to entity.
B. **Timeliness**: Makes sure that the information is provided when it is required most in making decisions.
C. **Understandability**: Enables easy understanding by people who have reasonable accounting knowledge.
D. **Confidence and reliability**: Better trust in reported financial information [17][18]. Expert systems add to these enhancing features through standardization of reporting procedures, consistency in application of accounting policies as well as expediency in reporting. Consequently, financial reports are made more similar, on time and readable, and this increases the confidence of the stakeholders in the information reported [15][10].

3. Methodology

3.1. Research Design

The research design chosen in this study is descriptive-analytical research design, which is a common research design in

accounting and information systems study since it aims to test the relationship between variables as well as to test the theoretical hypotheses using empirical data. The proposed method is suitable to fulfill the purpose of the study as it will enable the systematic examination of the perceptions toward the use of expert systems as an artificial intelligence method and their effect on the quality of financial reports.

3.2 Study Population and Sample

The target population of the study is the faculty in accounting departments of the Iraqi universities. The targeted study sample was chosen deliberately among accounting scholars at Kufa University of Science and Technology and Warith Al-Anbiyaa University, as they are relevant academically, and possess the knowledge on accounting systems, and the financial reporting practices. The target respondents were able to distribute 133 questionnaires.

Among them, 112 of the valid questionnaires were received and were found to be qualified to undergo statistical analysis, which corresponds to a response rate of about 84.2 and that is acceptable and adequate in undertaking an inferential statistical analysis in a social science research.

3.3. Data Collection Instrument

The structured questionnaire was used to collect data; it was created in accordance with the relevant literature and previous empirical research. The questionnaire was composed to determine the study variables in a five-point Likert scale, between (1) Strongly Disagree and (5) Strongly Agree, so that the respondents could indicate the extent of their agreement with the statement. The questionnaire will be divided into two major sections:

The independent variable, i.e. Expert Systems as an Artificial Intelligence Technique, is measured in the first section.

The second section is the measurement of the dependent variable, which is the Financial Reporting Quality based on its known qualitative attributes.

3.4. Measurement of Variables

3.4.1. Independent Variable: Expert Systems

The independent variable is the utilization of expert systems as one of the AI methods and was measured using a few items that represent the following considerations [19] :

A. The dependency of the expert systems on the highly developed information systems to deliver answers to complicated problems.
B. Expert systems capability to represent human expertise in solving problems.
C. The use of the expert systems as advisory in the decision making process of the organization.
D. The role of the expert systems in knowledge acquisition and managerial thought, instead of it being a source of crude data.

3.4.2. Dependent Variable: Financial Reporting Quality

The measurement of financial reporting quality was done in the terms of the qualitative aspects of financial information, which are conceptualized in accounting literature and international accounting standards. Such properties are][20]][21]:

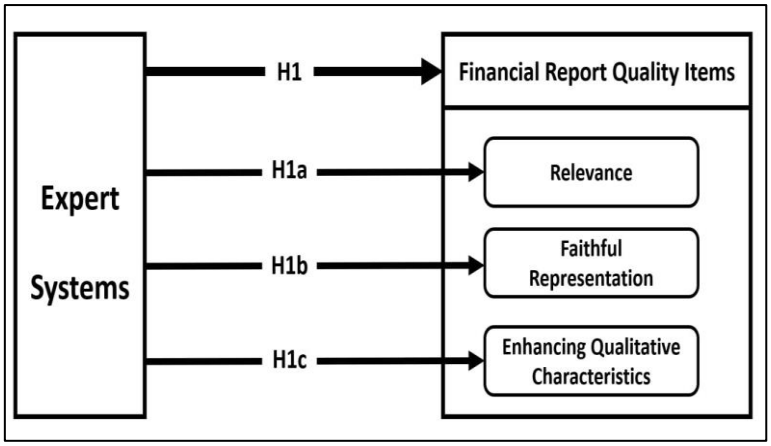

Figure (١) Study Plan

3.4.2.1. Relevance

A. Anticipatory worth of financial data.

B. Confirmatory value.

C. Relevance and decision making value.

3.4.2.2. Faithful Representation

A. Financial information neutrality.

B. Freedom of material mistakes.

C. Fullness and transparency without prejudice and falsification.

3.4.2.3. Enhancing Qualitative Characteristics

A. Comprehensibility of financial reporting.

B. Comparability between accounting periods.

C. Timeliness of the disclosure of information.

D. More confidence and reliance on the financial reports.

3.5. Validity and Reliability

Questions in the questionnaire were also checked with a panel of experts in accounting and information systems to achieve content validity. Cronbach Alpha coefficient was used to determine the

reliability of the measurement instrument; this is usually used to test the internal consistency of a measurement instrument. The values gained were more than the acceptable value of 0.70 and this means that the instrument is highly reliable and suitable to be statistically analysed.

3.6. Data Analysis Techniques

Statistical analysis data were used to analyze the collected information. The analysis included:

A. Descriptive statistics (standard deviations and means) to present the perception of people in regard to the respondents.

B. Reliability test to establish internal consistency.

C. Test of the impact of expert systems on financial reporting quality and its dimensions using inferential statistical tests.

4.DATA ANALYSIS

The process of data analysis was done in three steps where the first step gave an overview of the data collected by use of descriptive analysis. The other two use two steps PLS-SEM analysis that involves: a) assessment of the measurement model through validity and reliability measure; b) the assessment of the structural model that incorporates the path analysis of the hypothesized relationships.

4.2. Descriptive Analysis

The results of the descriptive analysis show that all the items of the expert systems variable measured a mean above the hypothetical mean of (3), on the five points Likert scale, which is an indication of positive perception of the respondents about the use of expert systems. Likewise, the items concerning financial reporting quality

and its dimensions, were above the hypothetical mean, which showed that the research sample had a satisfactory financial reporting quality. The values of standard deviation are rather low, which indicates the stability in the perceptions of respondents and a proper comprehension of the questions in the questionnaire.

4.2.2. Descriptive analysis of the expert systems variable

Table (1) Descriptive Analysis of Study Variable Items

Standard Deviation	Mean	Paragraph	variable
١.١١	٣.٥٤٨	GR١	Expert systems
١.٣٢	٣.٧٨٤	GR٢	
١.١٦٥	٣.٧٠٩	GR٣	
٠.١٠١	٣.٧٢٣	GR٤	
١.١٠٣	٣.٧٦٠	GR٥	

Source: SmartPLS program outputs

4.2.3. Descriptive analysis of the financial reporting quality variable

Table (٢) Descriptive Analysis of Financial Report Quality Items

Standard Deviation	Mean	Paragraph	variable
١.٠٠٢	٣.٣٣١	TY1	Financial Report Quality Items
٠.١٩١	٣.٧٠٩	TY2	
١.٢١٠	٣.٧٦٩	TY3	
٠.٩٨٠	٣.٩٨٠	TF1	
٠.٩٠١	٣.٦٦٧	TF2	
١.٠٩١	٣.٨٨	TF3	
٠.٨١٩	٣.٩٩١	TD١	
١.١٩٠	٣.٩٢٣	TD٢	
١.٢٢١	٣.٧٧٢	TD٣	
١.١٠٩	٣.٨٧٣	TD٤	

Source: SmartPLS program outputs

4.3. Evaluating the Scale Model

In order to test the measurement capability of the research variables using the questionnaire, the required indicators as suggested by Hair et al. (2017) were applied. They are: 1) Cronbach alpha (minimum0.7); 2) Saturations (minimum0.6); and 3) Extracted Variance (AVE) (minimum0.5). These indicators are shown in Table (3) and the findings reveal that they are within the acceptable limits.

4.3.1. Evaluating the measurement model for the expert systems variable

Using SmartPLS software, a measurement model was built, the results of which are shown in Table (3):

Table (3) Results of the measurement model for the expert systems variable

AVE	composite reliability	Cronbach Alpha	loading	items
٠.٧٨٠	٠.٦٩٩	٠.٧٧٨	٠.٧٩٠	GR١
			٠.٧٦١	GR٢
			٠.٧٨٣	GR٣
			٠.٧٧٤	GR٤
			٠.٧٦٧	GR٥

Source: SmartPLS program outputs

Table (3) indicates the results of the measurement model test that indicated that all the items had reached the acceptable limits of saturation and the variables have reached the acceptable limits of Cronbachs alpha, composite stability and AVE.

4.3.2. **Evaluating the measurement model for the financial reporting quality variable**

The SmartPLS software was used to construct a measurement model, the outcomes of which are presented in Table (4):

Table (4) Results of the model test to check the financial reporting quality variable.

AVE	composite reliability	Cronbach Alpha	loading	items
٠.٦٤٥	٠.٧٨٣	٠.٧٦٧	0.848	TY1
			0.861	TY2
			0.852	TY3
			0.725	TF1
			0.806	TF2
			0.739	TF3
			0.776	TD١
			0.814	TD٢
			0.٧٧٦	TD٣
			0.٧٧4	TD٤

Source: SmartPLS program outputs

Table (4) shows the results of the measurement model test, which showed that all items achieved the acceptable limits of saturations, and the variables achieved the acceptable limits for Cronbach's alpha, composite stability, and AVE.

4.4. Structural Model

In order to test the relationships between the studied variables, a path model was built using SmartPLS, where each path (relationship) is significant when t value > 1.96 and p value < 0.05. Table 5 and figure ٢ illustrate the results.

Table 5. Path Analysis

Hypothesis	path	Path coefficient	t Value	p Value	Result	R^2	R^2 adjusted
H1	TRU → GR	0.567	11.751	0	Accepted	0.424	0.422
H1a	RT → GR	0.271	4.615	0	Accepted	0.513	0.511

H1b	TF → GR	0.349	5.589	0	Accepted		
H1c	FD → GR	0.236	4.728	0	Accepted		

Table (5) presents the results of the structural model evaluation for the sub-hypotheses. The path coefficients for the sub-hypotheses (H1 ،H1a, H1b, H1c) met the required criteria for t and p values, indicating the significance of these relationships and thus the acceptance of the sub-hypotheses. Furthermore, the coefficient of determination (R^2) reached $R^2 = 0.71$ %, meaning that the expert systems variable explained 89% of the factors explaining the dimensions of the financial reporting quality variable. The remaining percentage represents factors not addressed in the study.

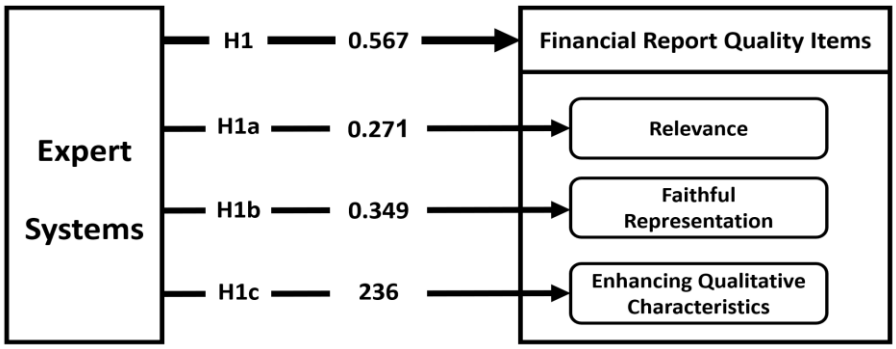

Figure (٢) shows the results of the path analysis

5. Discussion

This study was aimed at investigating the role of the expert systems as a technique of artificial intelligence in improving the quality of financial reporting as perceived by the accounting faculty members within the university of Kufa and Warith Al-Anbiyaa University. Empirical findings of the catalysts of the relationship between the three factors derived by PLS-SEM analysis give a solid evidence to the proposed theoretical framework and hypotheses of the research.

All in all, the results suggest the substantial and positive effect of the implementation of expert systems on the financial reporting quality, which supports the fact that intelligent accounting systems grow in importance both in academic and professional settings. The finding is in line with the perception that artificial intelligence applications not only help in operational efficiency but also qualitative increase in accounting outputs.**5.1. Impact of Expert Systems on Financial Reporting Quality**The positive correlation that had been established between the presence of expert systems and quality of the financial reporting was a pointer, that smart systems are a significant variable in improving the utility of financial reporting and its dependability. Another way that expert system assists in enhancing consistency is that it reduces human error and objective judgment, which is a significant attribute of high quality and financial reporting by applying the use of expert knowledge and rules that regulate standard reasoning in accounting. These findings confirm the hypothesis in the theory that the traditional accounting mechanisms are increasingly becoming less efficient in operating in complex financial environments that are characterized by high levels of change, high volumes of data and more expectations of transparency. One of the potential solutions in this respect is the expert systems which can transform the accounting systems into active processes, instead of passive data processing systems

5.2. Expert Systems and Relevance of Financial Information

The results demonstrate that expert systems are significant contributors of the relevancy of financial information. This observation is attributed to the fact that expert systems are able to apply financial data in timely and solution accurate way, which

boosts the predictive and affirmative value of the information reported. Relevant financial information will help the decision-makers to make a better choice, depending on the analysis of the organizational performance and the possibility to anticipate the future outcomes, which is particularly important in the academic and institutional setting.

There is the positive relevancy effect, which demonstrates the significance of the expert systems in simplifying the financial reporting practices to the informational need of the users. The use of expert systems also aids in improving the usefulness and materiality of financial reports as it presents them in decision oriented forms other than in raw data.

5.3. Expert Systems and Faithful Representation

It is also observed that expert systems positively affect faithfulness representation to a considerable extent in the study that indicates that financial information generated or assisted by expert systems is truer to the economic reality of the situation. This is attributed to the automated verification procedures and rules of standard accounting that are captured into the expert systems and hence less biased, complete, and material.

The fidelity is of great relevance where it is probable that the manual accounting processes may lack consistency or be subjective. Based on the findings, the expert systems foster the neutrality, reliability of the system, which increases the confidence of the stakeholders to the financial reports and good decision making.**5.4. Expert Systems and Enhancing Qualitative Characteristics**

In addition to relevancy and faithful representation, the findings confirm that the expert systems possess positive effects to the enhancing qualitative characteristics of financial reporting like those of comparability, timeliness, understandability and confidence.

The expert systems may also be used to make more reliable comparisons between the periods and entities, through standardization of the reporting process and expediting of information processing and also warrant timely reporting of the financial information. Improved intelligibility and improved confidence may also indicate that the expert systems have the ability to facilitate improved presentation of financial information and increase confidence that the users have in the reported figures. This observation shows the increased contribution of intelligent systems to the overall usability and believability of financial reporting.

5.5 Theoretical and Contextual Implications

Theoretically, the results assist in proving the hypothesis according to which expert systems are one of the major mechanisms whereby artificial intelligence can improve the quality of accounting. The research enhances the current literature by empirically proving this relationship in a developing-country setting, which is a gap in the earlier literature that has mainly concentrated on the developed economies. The findings are based on the Iraqi academic environment, indicating the willingness of the accounting faculty members to appreciate the importance of expert systems in enhancing the financial reporting practices. This indicates that there is an increasing realization of the digital transformation and

how artificial intelligence can be used to transform accounting education and practice.**6.Recommendations**

A. In accordance with the findings and conclusions of the study, it is recommended to propose the following recommendations:
B. The universities and accountancy institutions are being promoted to incorporate expert systems in reporting financial matters to improve the quality and reliability of the accounting information.
C. The accounting curriculums need to be revised to incorporate the use of artificial intelligence and specifically expert systems to provide future accountants with competence in current accounting practices.
D. The accounting faculty members and practitioners must be introduced to continuing professional development programs to enhance their performance of using expert systems when making financial reporting and decision.
E. Policymakers and professional accounting organizations ought to develop enabling structures and principles that will enable acculturization of artificial intelligence technologies in accounting systems.
F. Future researchers can build on this study by accomplishing other artificial intelligence applications, including machine learning and big data analytics, and the effects on the quality of financial reporting in various sectors and in various organizational contexts.

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