

THE IMPACT OF ARTIFICIAL INTELLIGENCE TECHNOLOGIES ON AUDIT EVIDENCE

Shaher Falah Al-Aroud, Al Isra University

ABSTRACT

Technologies of Artificial Intelligence (AI) are critical for future of the auditing profession. These technologies are actually vital tools that provide the auditing professionals with the means necessary for increasing the effectiveness and efficiency of their jobs. The aim of this study is to examine the effect of artificial intelligence technologies on audit evidence, from the point of view of certified auditors in IT companies in Jordan. Descriptive research design was adopted in the study among 314 auditors. Structured questionnaire was used to obtain the information needed for the study. The Findings of the study showed include that expert system has a significant effect on the audit evidence. Neural network technology has not significant effect on the audit evidence. The study recommended increased interest in artificial intelligence technologies by audit offices operating in Jordan because of its scientific importance in improving the collection of audit evidence.

Keywords: Artificial Intelligence Technologies, Audit Evidence.

INTRODUCTION

The AI science is a technical science that, by simulation of the human intelligence, expands, extends, and develops research in order to establish theory, methods, technology, and application systems. In brief, it is computer system that has the ability to transform the human wisdom into productive work via technology. By applying AI methods, the user can greatly improve the classical information transmission process by virtue of improving the transmission speed, reducing the transmission cost, and overcoming a series of bottlenecks in problems. (Griffin, 2016; AI Topics, 2016).

The bulky data provided by a large number of data sources and the almost unlimited computing power of cloud computing break the bottleneck that restricts development of AI and enable implementation of the deep learning algorithm. In addition, deep learning enables implementation of various machine learning applications and expands the scope of the AI research. Deep learning has already been involved in numerous applications. In this respect, artificial intelligence can be thought of as a 'container' of the human wisdom. Hence, development of the deep learning algorithms and methods will expand this 'container' to an extent that the humans cannot predict (Demski, 2007; Greenman, 2017).

Accounting is one of the business fields in which the Information Technology (IT) techniques have been widely applied. Albeit IT was first applied in the fundamental accounting systems, financial modelling software soon later proved to be of highly-beneficial use in the analytical facets of accounting. However, the pace of IT adoption by the accounting profession was regarded as slow owing to the conservative approach of its early adopters. By the late 1990s, this profession was compelled to computerize its processes and operations as a way of enhancing their efficiency, eventually, to confront the competition and reduce the expenses (Manson et al., 1997; 2001).

Currently, the IT tools are commonly employed in a broad range of tasks, extending from simple tasks like arithmetic computations to sophisticated ones like statistical analysis and flowcharting. Those tools encompass the logit models; checklists; toolkits; expert systems; encircling purposely-developed programs and standard software packages; audit enquiry software that can perform in-depth analysis and testing of data; internal control templates that are frequently utilized for identification of weaknesses and strengths of systems; and integrated audit monitoring modules, which are programmed routines that continually monitor real data and their processing circumstances (Omoteso, 2012).

The audit profession has substantially changed over time because of technological change. Many changes in this profession have already been witnessed. They include an increase in the number and sophistication of the auditing rules, numerous changes in the standards of professional ethics, an improved quality of the audit work, growing competition among the audit firms, reduced audit fees, and provision of new services to the customers (e.g., financial and computing advices). Additionally, this profession has witnessed development of new audit types and services. These factors have together made the auditing profession more and more competitive than ever before. Accordingly, the new methods and tools provided by the IT and AI have been widely adopted by auditors. They made available more suitable and timely information to facilitate and speed up the auditor's decision-making process. Consequently, they improved the audit efficiency and quality (Yaniv, and Bengio 2016; He et al., 2015; Silver et al., 2016; Sun & Vasarhelyi, 2016; Vasarhelyi et al., 1998).

Financial audit can be defined as the activity made by independent, skilled person for analyzing the financial and economic information that are extracted from examined accounting documents by using relevant review and verification methods. The objective of this activity is to issue report that express the auditor's opinion about reliability of that information so that this information will be known by, and of use for, a third party (R. D. 1636/1990, Account Auditing Regulation).

The audit areas wherein the expert systems can be employed are diverse and wide. They almost include every audit task, where judgment of an audit professional is required. In terms of their nature, the expert systems can be generally classified into three categories: (i) internal, (ii) external, and (iii) EDP audit expert systems. So far, auditing proved to be the accounting domain with the highest number of developed expert systems. This served as motive for the researcher to research into this area and to investigate the extent to which the audit offices in Jordan use AI techniques in evidence collection.

PROBLEM STATEMENT

The knowledge gaps, which are indeed sub-problems that culminated to the research problem, and which are addressed by this study, are four. First is lack of experience in the time being in the application of AI methods in the area of audit evidence in Jordan, which is an application that is still at its beginning, where even though application of automation is extensive, scope of automation is mainly restricted to financial reporting. It has not yet reached to core accounting areas like financial analysis and audit or made influence that can lead to changes in the accounting standards. When AI is incorporated into the audit work, it should replace every single step in the traditional audit work and provide proper decision-making suggestions in order to profoundly enhance the overall financial work. Thus, whether in terms of its breadth or depth, application of AI in the audit industry is still in embryo. Complexity of the AI technology and the lack of experience in its use have created big difficulties for its adoption and development.

Hence, a long way is still ahead to walk for development of AI in the audit area. Second is the high investment costs and low returns for the firms that are needed to introduce AI into the audit area. Thereupon, it is highly necessary to design unique AI system that complies with the characteristics of the audit profession and firms according to their actual situations. Firstly, the capital investment is the most important warranty. Secondly, after introduction of the AI technology, it is necessary to modify the management of the human resources and the daily operation routine of the firm. Lastly, once intelligent transformation of the audit information system is accomplished, training should be made, including training on use of the new system features and training on the information security. Because of the personalized features of the intelligent systems, the audit profession will need a huge number of resources in early application of the system and in its subsequent operation, which creates serious challenges to control of the costs of the enterprises. Considering the high investment costs and slow returns, many firms may concentrate on short-run profits rather than making strategic modifications. Hence, they may stop at the early stage of introduction of the AI technology. Third is that the quality of the professional talents that is improved by application of AI technology in the audit profession calls for professional talents to manage them, while the present senior accounting capabilities in Jordan are limited. Currently, paucity of the Jordanian accounting talents is alarming; the basic accounting personnel are in surplus whereas the top accounting talents are sparse. Within this context, integration of AI with the accounting work creates heightened demand on the accountants. So, the accounting personnel do not only need professional knowledge in accounting, but they also need to master the IT and develop skill in use of the accounting software and data management in order to adapt to the developments and the associated changes in the work conditions. Lastly, the training programs of the accounting students in the universities need modification and improvement.

Currently, most of the Jordanian universities offer appropriate courses in accounting computerization. However, affected by a number of external and internal factors, those courses have some problems associated with them like unification of the contents of the courses, lack of links between the theoretical knowledge and the practice, and difficulty of building a scientific computerization system. These factors make it difficult to meet the requirements of development of the profession with time. The university graduates are the main working force of the accounting profession in the future, though, in the time being, the talent training programs in those universities fail to make parallel adjustments for accounting education reform. Actually the offered courses and training programs lack IT courses with an AI focus and pay limited attention to innovation of accounting concepts. This results in lack of market competitiveness among the university graduates and in their inability to meet the future market demand on accounting professionals.

RESEARCH QUESTIONS

1. To what extent does expert system affect the audit evidence from the point of view of certified auditors of IT companies in Jordan?
2. To what extent does neural network technology affect the audit evidence from the point of view of certified auditors of IT companies in Jordan?

RESEARCH OBJECTIVES

The general objective is to ascertain the effect of artificial intelligence on the audit evidence from the point of view of certified auditors of IT companies in Jordan. The specific objectives of the study included:

- (i) To ascertain the effect of expert system on the audit evidence from the point of view of certified auditors of IT companies in Jordan?
- (ii) To ascertain the effect of neural network technology on the audit evidence from the point of view of certified auditors of IT companies in Jordan?

SIGNIFICANCE OF THE STUDY

The importance of the study lies in the fact that it examines one of the new methods and new systems used in the audit process by using audit offices operating in Jordan for artificial intelligence techniques in the collection of audit evidence, which is an important element in the nature of the audit process where its importance in the accreditation of the auditor based on the composition of his professional opinion is not contrary to the international audit standards on the one hand and the legislation adopted on the other. The study takes on additional importance in two ways:

First. Theoretical importance: This importance is highlighted by the theoretical and intellectual enrichment that may contribute by tracking theoretical literature and previous studies of the key variables related to artificial intelligence in the collection of audit evidence (expert systems, neural networks) in IT companies in Jordan and in a form that is an integrated conceptual framework for these concepts and the methodology of their study. This importance also highlights the ability to make a modest contribution by tracking theoretical literature and previous studies of key variables in the form that is the conceptual and procedural framework of the study. In addition, the study will bring results to audit offices operating in Jordan in a way that helps them to take advantage of artificial intelligence techniques in collecting audit evidence.

Second: Practical importance: the practical importance of this study comes from what it can offer to decision makers in the audit offices operating in Jordan and the possibility of benefiting from its results in a way that helps them to know the importance of artificial intelligence technologies in this way in a way that does not conflict with international audit standards, and this study is important in that it will address a topic related to the extent to which audit offices use Artificial Intelligence techniques to collect audit evidence in these companies.

THEORETICAL FRAMEWORK AND PREVIOUS STUDIES

The Correlation between Artificial Intelligence and Audit

The AI literature is quite voluminous. It ranges from algorithmic essays (e.g., Courbariaux et al., 2016) to broad set of applications in varying research areas (Zhang et al., 2015; Silver et al., 2016). However, research into AI in auditing is limited. Moreover, the overwhelming majority of the 'now-aged' publications are centered on the expert systems. These systems have been often advocated as systems with potential for use in tax planning and in the audit process. Gillett (1993) developed audit expert system (AES) to help auditors in tailoring the audit programs and described the initial steps of the long execution process (Vasarhelyi et al., 1998). Furthermore, during the period 1989-2005, six volumes of book series were published

that covered variety of the expert system applications and discussed the added values which these systems lent to accounting and auditing (Vasarhelyi et al., 1998).

Study conducted by Issa et al. (2016), *Research Ideas for Artificial Intelligence in Auditing: The Formalization of Audit and Workforce Supplementation*. This paper proposes various areas of AI-related research to examine where this emerging technology is most promising. Moreover, this paper raises a series of methodological and evolutionary research questions aiming to study the AI-driven transformation of today's world of audit into the assurance of the future. Bai (2017), this paper introduces the present situation of the application of artificial intelligence in the field of audit services in the four major international accounting firms, analyzes the impact of artificial intelligence on the audit industry and the relevant auditing practitioners, and regulators who are responsible for the industry regulations. To take an in-depth analysis of the coping strategies.

Study of Kokina & Davenport (2017) provides an overview of the emergence of artificial intelligence in accounting and auditing and discuss the current capabilities of cognitive technologies and the implications these technologies will have on human auditors and the audit process itself. We also provide industry examples of artificial intelligence implementation. The same context Omoteso (2012) via the application of artificial intelligence in auditing: Looking back to the future. discussed the significance of auditors' use of artificial intelligent systems in arriving at audit judgements. Specifically, it reviewed research efforts on the use of expert systems and neural networks in auditing and the implications thereof.

Gusai (2019), this study aimed to study the importance of artificial learning in accounting and auditing areas and measure the degree of forthcomings regarding artificial intelligence in accounting. Conclusion This study AI paves way for a better and conducive environment in the field of accounting and auditing. Development in the field of AI can definitely be a great help to human efforts.

Greenman (2017) exploring the Impact of Artificial Intelligence on the Accounting Profession. AI is a vital tool that will provide these professionals with the needed tools to increase the efficiency and effectiveness of their occupations. The repetitive tasks of bookkeeping or process-driven assignments are more likely to be replaced with an automated technology than the higher value specialties that involve professional judgment. Many believe that the younger generation of accountants need to understand and be prepared to work alongside artificial intelligence.

Li & Zheng (2018), this paper focus on how to use artificial intelligence to avoid accounting fraud and to generate positive impact on accounting information quality, this article analyzed how artificial intelligence effect the accounting personnel. the article underline that in the big picture of artificial intelligence, accounting personnel should improve its own seven aspects of abilities and become a comprehensive qualified personnel.

Luo et al. (2018), this paper takes the application of artificial intelligence in the accounting industry as the research object, analyzes the impact of artificial intelligence on the development of accounting industry, and puts forward relevant suggestions for its existing problems.

Chukwudi al. (2018). The aim of this study is to examine the effect of artificial intelligence on the performance of accounting operations among accounting firms in South East Nigeria. The result of the study showed that Expert system has a significant effect on the performance of accounting function of accounting firms in South East Nigeria. It was concluded

that, the application of artificial intelligence positively influences the performance of accounting functions.

RESEARCH HYPOTHESIS

As contained in the statement of objectives, it is logical to identify relationship between (artificial intelligence and audit evidence) that now form the bases of the hypotheses of the study. The resultant hypotheses formulated in order to carry out this research are as follow;

H01: Expert system has no significant effect on the audit evidence from the point of view of certified auditors of IT companies in Jordan.

H02: neural networks has no significant effect on the audit evidence from the point of view of certified auditors of IT companies in Jordan.

RESEARCH METHODOLOGY

Research design is very crucial to actualize the research objectives (Bhatti et al, 2012). This study applied a quantitative research design. Quantitative research design will enable the researcher to test the relationship between the research variables. It will also enable the researcher to unvaryingly determine if one concept or idea is better than the others. It can also respond to questions on the relationships that exist among measured variables with the aim of elucidating, envisaging, as well as controlling phenomena (Sekaran & Bougie, 2016). Thus, quantitative research design is an appropriate method for this study since it permits testing the relationship between variables with the use of statistical approaches. This is in line with the main objective of this study that focus. Thus, quantitative research design is an appropriate method for this study since it permits testing the relationship between variables with the use of statistical approaches. (Sekaran & Bougie, 2016). This is in line with the main objective of this study that to examine the extent to which audit offices in Jordan use artificial intelligence technologies to collect audit evidence, from the point of view of certified auditors in IT companies in Jordan. Therefore, the specific question quantitative research also permits to carry out analysis using large sample to generalize the results among a set of population. Population and sample of the study.

Population and Sampling

Sekaran & Bougie (2016) define population as the entire group of people, events, or things of interest that the researcher wishes to investigate. The population size of this study consists of (582) licensed auditors and practitioners and exercises the audit function of the 220 IT companies registered in the Association of Information Technology Companies in Jordan. As stated by Sekaran & Bougie (2016), “the level of aggregation of the data collected during the subsequent data analysis stage” is known as a unit of analysis. Therefore, the unit of analysis is individual based, means that data was collected from licensed auditors and practitioners is the unit of analysis of the study. There are two types of sampling methods which are non-probability and probability samplings. The researchers in this study opted probability sampling method which is inferred as simple random sampling technique. By that, each aspect pertaining to the selected population may be represented in the sample (Zikmund et al., 2013).

As recommended by Krejcie & Morgan (1970), the appropriate sample size for a population size of 582 is 274. In order to lessen sample size error and putting into consideration the occurrence of non-response by some respondents, the sample size was increased by as

suggested by Barlett, et al. (2001). Therefore, the sample size of this study had become by $(274+40=314)$. Hence, 314 questionnaires were distributed to the sample, eleven of them were excluded because they were not filled completely or correctly so (303) questionnaires were valid.

Instrument for Data Collection

The survey instrument is designed by adapting related items from past related studies of the variables being investigated. Structured questionnaire was used to obtain data for the study. The questionnaire was divide into two sections. Section (A) information on Artificial Intelligence Technologies while section B, information on Audit Evidence, The questionnaire items relating to the study objectives were structured in Likert scale is a five points.

Data Analysis Techniques

The main goal of this study is to test the research hypotheses in line with the study's conceptual framework. As this study is quantitative in nature, it intends to empirically justify the proposed theoretical frame by analysing of the relationships between variables. two major analyses were involved. The first is descriptive analysis and test the research hypotheses by were used within the program (SPSS Statistical Package for Social Science).

Validity of the Instrument

The questionnaire was properly designed and a conduct of a pre-test on every question contained in the questionnaire was carried out to ensure validity. The researcher subjected the instrument to face and content validity by giving it to five experts and specialists in artificial intelligence and accountants, who studied the instrument thoroughly to ensure they are in line with the objectives of the study.

Reliability of the Instrument

Procedurally, the researchers pre tested thirty (30) copies of the test instrument before the actual survey for the study. The responses obtained from the pre-study survey were subjected to the Cronbach Alpha's internal consistency test via SPSS (statistical package for social sciences) . Based on the inter-item correlation of Twelve (16) items on the questionnaire the result of the reliability test is 0.88. Since the item on the questionnaire were uniformly scaled and in accordance to the Sekaran & Bougie (2016), benchmark of Cronbach's alpha should be 0.700 or above. The raw Alpha Coefficient of 0.88 shows that the items on the questionnaire are internally consistent, hence they are reliable.

METHOD FOR DATA ANALYSIS

First: Results of Descriptive Statistics

Means and standard deviations to the extent to which audit offices in Jordan use expert systems technology to collect audit evidence and the following tables show the results from the point of view of the study sample members, as follows:

Table 1				
MEANS AND STANDARD DEVIATIONS FOR EXPERT SYSTEMS				
Items rank	Items	Mean	Standard Deviation	Degree of Importance
4	Application software based on knowledge bases is used in a particular area of expertise	3.776	0.7299	High

8	Expert systems are used to collect audit evidence by reformulating them in the form of computer-hosted software	3.564	0.6804	High
2	Expert systems are used to extract knowledge to resolve problems with the collection of audit evidence	3.905	0.6835	High
7	Advanced software languages are used to improve the collection of audit evidence	3.670	0.8221	High
1	Expert systems are used to be able to advise and make the right decisions regarding audit evidence	3.917	0.6212	High
6	Knowledge and control of the search for audit evidence are represented within databases	3.694	0.6730	High
7	The expert system is used as a hierarchical frame that reflects the accounting knowledge set for audit evidence	3.858	0.6006	High
8	The expert system is used to collect audit evidence to be encrypted in a program and stored in the system's knowledge base	3.752	0.7385	High
Total		3.767	High	

Table 1 indicates that the total mean of the extent to which audit offices in Jordan use the technology of expert systems in the collection of audit evidence, from the point of view of certified auditors in IT companies in Jordan, have reached a high level of (3.767). The standard deviations of the terms covered by this variable indicate the extent to which the values of this variable are dispersed from the means of all items, noting that they are low and indicate that the responses of the sample study are very similar and consisting.

Second: Means and Standard Deviations to the Extent that Audit Offices in Jordan Use Neural Network Technology to Collect Audit Evidence

Table 2 MEANS AND STANDARD DEVIATIONS FOR COLLECT AUDIT EVIDENCE				
Items rank	Items	Mean	Standard Deviation	Degree of Importance
3	Neural network technology is used to complete the collection and practical implementation of integrated electronic audit evidence.	3.835	0.6874	High
4	Neural networks are used to store information about the collection of evidence for the collection of links and communications	3.729	0.6967	High
7	Electronic processing units are available for the collection of neurons that make information available to users			
8	Neural networks are used in mathematical models of audit guides formulated in diagrams that mimic the qualities found in computer systems	3.588	0.8351	High
2	Neural networks are used to process information on audit evidence and provide solutions to complex problems in parallel	3.564	0.6804	High
6	Neural networks contribute to providing solutions and recommendations to the user in a clear and accurate picture about the evidence of auditing	3.905	0.6835	High
1	Neural networks allow the user to enter instructions and information related to audit evidence to obtain accounting information	3.670	0.8221	High
5	Neural networks can explain the steps of collecting	3.917	0.6212	High

	audit evidence to reach the solution and the reasons behind this solution			
Total		3.739	High	

Table 2 indicates that the total means of the extent to which audit offices in Jordan use neural network technology to collect audit evidence, from the point of view of certified auditors in IT companies in Jordan, have reached a high level of (3.739). The standard deviations of the terms covered by this variable indicate the extent to which the values of this variable are dispersed from mean of all items, noting that they are low and indicate that the responses of the sample study are very similar and consisting.

Hypotheses Testing

The data collected from the Sample was analyzed. Inferential statistic of regression analysis was used in testing the study hypotheses at 5% level of significance. The decision will be, Reject H0 if the p-value is less than 0.05.

Expert system has no significant effect on the audit evidence from the point of view of certified auditors of IT companies in Jordan.

Table 3 RESULTS OF REGRESSION ANALYSIS FOR EXPERT SYSTEM AND AUDIT EVIDENCE				
R	R square	F-statistic	Sig	t-test
.906	0.847	709.457	0.000	24.767

Table 3 shows the linear regression result of expert system and audit evidence from the point of view of certified auditors of IT companies in Jordan. The result which sort to reveal the effect of expert system on audit evidence, revealed that there is a strong positive relationship between expert system and audit evidence (R-coefficient=0.906). The R square, the coefficient of determination, shows that 84% of the variation in audit evidence can be explained by expert system no autocorrelation as Durbin- Watson (0.722) is less than 2. The extent to which expert system affect audit evidence with the .906 value indicates a positive significance between expert system and audit evidence which is statistically significant (F-statistics=709.457; t=24.767) and $p=0.000 < 0.05$. Therefore, the null hypothesis is rejected and the alternate hypothesis accepted accordingly, hence expert system has a significant effect on the audit evidence.

Hypothesis Two

Neural networks has no significant effect on the audit evidence from the point of view of certified auditors of IT companies in Jordan.

Table 4 RESULTS OF REGRESSION ANALYSIS FOR NEURAL NETWORK TECHNOLOGY AND AUDIT EVIDENCE				
R	R square	F-statistic	Sig	t-test
0.081	0.006	0.525	0.470	0.724

Table 4 shows the linear regression result of neural network technology and audit evidence from the point of view of certified auditors of IT companies in Jordan. The result which sort to reveal the not effect of neural network technology on audit evidence, revealed that there is not strong positive relationship between expert system and audit evidence (R- coefficient = 0.081). The R square, the coefficient of determination, shows that 06.0 % of the variation in audit evidence can be explained by expert system. The extent to which neural network

technology affect audit evidence with the 0.081 value indicates not positive significance between neural network technology and audit evidence which is statistically significant (F -statistics=0.525; t =0.724) and p =0.470. Therefore, the null hypothesis is rejected and the alternate hypothesis accepted accordingly, hence neural network technology has not significant effect on the audit evidence.

CONCLUSIONS

Even though Artificial Intelligence is promising now and the future, most Researchers and organizations are oblivious to adopt the skills and knowledge that it demands. From the researcher's experience, there is the need to assess the impact of Artificial Intelligence on audit evidence. Therefore, the purpose of this study is to explore the impact of Artificial Intelligence on audit evidence in order to the acquisition to skills and knowledge.

This present study takes a contemporary issue on the integration of Artificial Intelligence in audit evidence which tries to look at the universal questions raised by investigators or researchers. The two fundamental questions addressed in this study to what extent does expert system affect the audit evidence from the point of view of certified auditors of IT companies in Jordan. And To what extent does neural network technology affect the audit evidence from the point of view of certified auditors of IT companies in Jordan. This is the research problem addressed by this study. The information from this study will help the researchers on investigate a Impact of Artificial Intelligence in audit evidence from the point of view of certified auditors in IT companies in Jordan. In this study, the primary source was a Questionnaire conducted on certified auditors in IT companies in Jordan.

RECOMMENDATIONS

Based on the findings of the study, it is recommended Researchers that:

1. Increased interest in Artificial Intelligence technologies by audit offices operating in Jordan because it is practically important in improving the collection of audit evidence.
2. Emphasize the need to use sophisticated software languages and encrypt them in a program and save them in the system's knowledge base to improve the collection of audit evidence.
3. Emphasize the importance of using neural networks in mathematical models of audit guides formulated in diagrams that mimic the qualities found in computer systems.
4. Audit offices operating in Jordan must provide electronic processing units for the collection of audit evidence in the form of neurons that make information available to users.
5. Focus on training auditors to keep pace with technological advances in AI applications in collecting audit guides, representing knowledge, and controlling the search for such evidence within databases.
6. Importance of relying on the use of smart software to develop the process of collecting and reformulating audit evidence in the form of computer-embraced software for its role in improving the quality of the audit process.
7. Make better use of neural networks especially with regard to providing solutions and the reasons behind this solution and recommendations to the user in a clear and accurate form about the audit guides.
8. Pay more attention to giving auditors many opportunities to develop and practice the application of artificial intelligence methods because of their importance in improving the collection of audit evidence.

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