How to Cite:
Mirzaei, A., Hajizade, M., & Hajizade, H. (2022). Studying the effect of artificial intelligence on improvement of various quality criteria in relation to audit work in Iran. *International Journal of Health Sciences*, *6*(S1), 12623–12635. https://doi.org/10.53730/ijhs.v6nS1.8181

Studying the effect of artificial intelligence on improvement of various quality criteria in relation to audit work in Iran

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***Abstract*---**Considering huge volume of data and increasing trend of artificial intelligence technology in all of the scopes, classic auditing methods are insufficient; so, using artificial intelligence in the audit field has gained special importance. The study has been performed to the aim of studying the effect of artificial intelligence on quality of audit work in Iran. Also, the reasons for lack of tendency of Iranian auditors to use artificial intelligence technology have been reviewed. Data have been collected through questionnaires provided to 150 auditors and managers being accepted upon inclusion criteria. Four research hypotheses have been analyzed through statistical tests. The research results showed that applying artificial intelligence along with data analyses related to items in financial statements, fraud detection, and slight audit cost reduction have positive effect on improvement of audit work's quality. Finally, it is advised that following points would be taken into consideration as for development of artificial intelligence in the field of auditing: strengthening professional capability of auditors in relation to artificial intelligence skills and knowledge; providing required substructure as for usage to be made of artificial intelligence in the field of auditing; and creating trust in auditors to use such technology. The study can be useful for researchers and audit companies interested in development of artificial intelligence.

***Keywords*---**Artificial intelligence, Work quality criteria, Audit.

Introduction

One of the most important skills required for auditors is the knowledge for data analysis through usage made of databank software packages which is considered as the main challenge for auditors and related companies and institutions. To do so, continuous training programs have to be taken into consideration along with development of software packages and substructures (1). Huge volumes of data have led to increasing complexity in production, storage, and analyses of information as the requirements for the work done by auditors. Therefore, classic audit procedures that are highly dependent on sampling and manual methods are insufficient. This is why; using artificial intelligence in the field of auditing is of special importance (2-3). From perspective of audit institutes in Iran, there are some big problems in audit process including increase of audit costs, auditors' lack of time, dissatisfaction of clients, violations in financial reporting, lack of sufficient data mining skills through artificial intelligence, auditors having no tendency towards using artificial intelligence, lack of companies' integration in using a unit standard technology, diverse methods of audit investigation in each audit company, and costly development of technologies based on artificial intelligence (1). Many of these problems can be solved using advanced technologies especially artificial intelligence. This way, wide range study of artificial intelligence and advantages of using it as well as its effect in quality of audit work in addition to usage made of large companies' experiments can be useful.

Artificial intelligence-based technology creates considerable progress in all of the auditing fields including auditors with high capabilities, automation of various types of tasks and solutions and also changes of capabilities and natures of artificial intelligence systems that helps continuous progress (4-5). Progress in the field of artificial intelligence can be complementary for human thoughts to reduce fraud, human errors, and to improve accuracy of accounting functions. Fraud detection is considered as one of the most important applications of artificial intelligence (6-7).

Currently tendency is towards development of related sciences due to dominance of accounting procedure on its methodology. Meanwhile, digitalization has led to considerable changes in method of accounting and has had positive effect on its development. Large developed countries take improvement of artificial intelligence as one of the important strategies to increase national competition (8). Briefly speaking, applying artificial intelligence has led to development and innovation in this industry and also increase of competition among companies. Using digital technologies in accounting, as well as preparation and provision of financial statement is an integrated part of an institution. Using technologies based on artificial intelligence creates following feasibilities for accountants and facilitates their works: creating electronic documents and reports, analyzing them, making sure of data storage, reduction of error and providing free access to information for users from outside and inside the companies (9). Accounting companies using artificial intelligence in their audit performances suggest such advantages as saving time, quick data analysis, increase of accuracy, deeper insight into business processes and also optimization of customer service (10). Also, using artificial intelligence in the field of auditing can solve such problems related to

inefficacy and low value added; and, audit work will become more creative while more value will be gained by the company. Recent studies show that artificial intelligence can improve work capacity (11). Despite potential applications of artificial intelligence, some fears are also being developed such as unemployment, changes of occupational skills, lack of society's confidence in replacement of artificial intelligence and human judgment (12).

Artificial intelligence systems have considerable effect on auditors as for playing their role better in supervising companies and businesses; and, recent progresses in development of artificial intelligence systems and increasing risk of data manipulation may outrival professional capabilities of auditors so that they could not be able of coping with it. So, auditors have to own data mining skills so that they can deal with various auditing status (13-16). Artificial intelligence is useful in effectiveness of work done by auditor through increase of profit and also audit quality (17). It can also help auditors through review of contracts so that less time would be spent by auditor for contract reading (18). This way more time can be saved by auditor for clients and data estimation; because, data analysis by artificial intelligence would be quicker and it acts better than humans in fraud detection and precision of review (17).

Large audit institutes make huge investments in using advanced technologies so that audit process would be strengthened (19). Despite all advantages related to using artificial intelligence in audit, still most of audit institutes do not use such technology. So, considering usefulness of artificial intelligence in quality of audit work, the paper is trying to study why artificial intelligence plays no key role in Iranian field of audit; and, through study of effect of artificial intelligence in quality of audit work in those companies using the technology, managers and auditors would be encouraged to use artificial intelligence while audit institutes would be motivated to develop the technology (20, 21). In fact, the paper has been written to the aim of showing the need for artificial intelligence in audit field. Huge volume of data and accumulation of financial reports, increasing development of new and complex technologies, and probability of errors occurring during manual analysis, importance of increasing relationship between auditors and clients, and saving time in audit process are from among those factors leading to increasing need of artificial intelligence in auditing.

The paper has been prepared to the aim of studying researches performed on artificial intelligence and its application in auditing as well as future consequences of its development. That is, effect of applying artificial intelligence on quality of audit work in Iran has been studied in the research so that its effect would be specified on cost reduction, fraud detection, and collecting data and evidence in audit work. This way, research hypotheses have been suggested as follows:

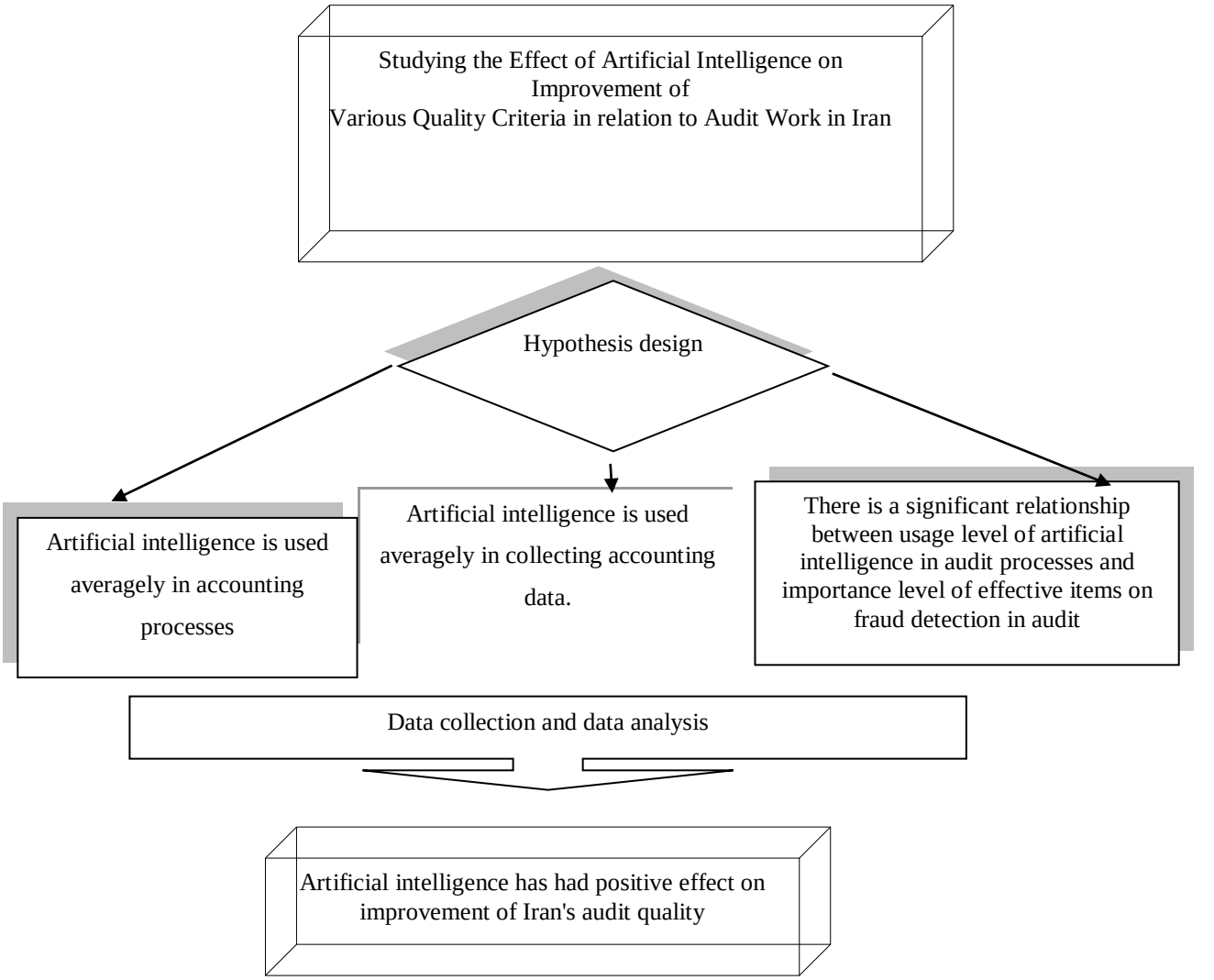
*First Hypothesis***:** Artificial intelligence is used averagely in accounting processes.
*Second Hypothesis***:** Artificial intelligence is used averagely in collecting accounting data.
*Third Hypothesis***:** There is a significant relationship between usage level of artificial intelligence in audit processes and importance level of effective items on fraud detection in audit (review of evidences, asking informed people, auditor's

supposition, review of reports from past periods, using artificial intelligence systems).
Fourth Hypothesis: There is a significant relationship between usage made of artificial intelligence to collect audit data and importance level of effective items on fraud detection in audit (review of evidences, asking informed people, auditor's supposition, review of reports from past periods, using artificial intelligence systems).

Method and Materials

This applied research in terms of objective is a descriptive-correlational study based on hierarchical regression analysis; because, effect of one variable is assessed on another variable. In conceptual research model, artificial intelligence has been considered as independent variable; and, various quality criteria of audit work have been considered as dependent research variables. Statistical research sample includes 150 financial experts and managers in companies that have passed following inclusion criteria into the study: provision of consent regarding participation in the study, and minimum five years of work records in the company while being a member of Audit Organization of Iran. To specify sample volume, Morgan table has been applied and samples have been selected based on stratified random sampling method. Considering limited numbers of those companies using artificial intelligence, those individuals with work record and skill of analyzing data through artificial intelligence have been used in the study.

To observe research ethics, participants have been assured of their information remaining completely confidential and studied with no name on it; while, they would be reported generally. Finally they have been provided by the research results. To measure research variables, audit work quality questionnaire based on artificial intelligence has been applied including 15 basic questions ranked as (low, very low, average, high, very high) respectively scored from one to five. Considering artificial intelligence studies being new in Iran and importance of the topic in work environments as well as no research tool being available for measurement; one tool had to be made and validated in this respect despite limitations and difficulties. Content validity of questionnaire has been confirmed via theoretical foundations and receiving views of 12 experts. Reliability of this researcher-made questionnaire has been obtained equal to 0.717 through Cronbach's alpha. Data have been analyzed through SPSS. Considering both variables and their components being measured quantitatively; Pearson test has been used to test hypotheses and multiple regression has been used to answer the question.



Figures 1. Research design

Findings

Descriptive Findings

Frequency distribution of education level of employees studied
from among 150 employees being studied, 90 (60%) with bachelor's degree; 40 (26%) with master's degree; and 20 (14%) with doctoral and post-doctoral degrees.

Frequency distribution of field of study of employees studied
from among 150 employees studied, 80 (53%) have studied accounting; 40 (27%) have studied auditing; and, 30 (20%) have studied economy.

Frequency distribution of work record of employees studied
From among 150 employees studied, 50 persons (33%) had a work record of 5-7 years; 40 persons (27%) had work record of 8-10 years; and, 60 persons had work record of over 10 years (40%).

Frequency distribution based on frequency distribution of personal characteristics
From among 150 employees studied, 10 persons have been financial manager (7%); 5 persons have been deputy finance managers (3%); 5 persons have been working as the head of financial department (3%); 100 persons have been financial expert (67%); 30 persons have been working in other organizational positions (20%).
Maximum frequency (58.18%) concerns those people with average level of skill in using artificial intelligence and minimum frequency (7.28%) concerns those people with excellent skill level in terms of artificial intelligence; while, 20% and 14.54% of them have had respectively weak and good skill levels in using artificial intelligence in performing audit processes.

Review of Research Hypotheses

Testing hypothesis one: Artificial intelligence is used averagely in accounting processes.
To do so statistically, mean values of the two independent samples extracted from companies' population included in the study have been compared. Each of the research hypotheses includes 5 questions and each question has one component. In this section, effect of artificial intelligence on that component will be measured through path analysis to see on which component the artificial intelligence has more effect. In fact, each hypothesis which by itself is a component to measure artificial intelligence application will be divided into five subcomponents.
To study this hypothesis, one sample t- test has been used. The results are provided in following table:

Table 1
The results from on sample student's t-test for first hypothesis

Descriptive statistics			Test results to compare the mean with 3		
Number of respondents	Mean score	Standard error	Rest statistic	Degree of freedom	Significance level
150	73.2	054.0	-966.4	149	000.0

According to the table, mean value of usage made of artificial intelligence in accounting processes is equal to73.2 and significance level of test is equal to zero. Therefore, mean value of using artificial intelligence in accounting processes is significantly lower than average value (3); and, first hypothesis would be rejected.

Testing the second hypothesis: Artificial intelligence is used averagely in collecting accounting data.

To study this hypothesis, one sample t-test has been applied and the results are provided in following table:

Table 2
The results from one sample student's t-test on first hypothesis

Descriptive statistics			Test results to compare the mean with 3		
Number of respondents	Mean score	Standard error	Rest statistic	Degree of freedom	Significance level
150	71.2	039.0	-425.7	149	000.0

According to table 2, mean value of usage made of artificial intelligence in collecting accounting data is equal to 71.2 and significance level of the test is equal to zero. Therefore, mean value of usage made of artificial intelligence in collecting accounting data is significantly lower than mean value of 3 and the hypothesis is rejected.

Testing the third hypothesis: There is a significant relationship between usage level of artificial intelligence in audit processes and importance level of effective items on fraud detection in audit (review of evidences, asking informed people, auditor's supposition, review of reports from past periods, using artificial intelligence systems).

To study this hypothesis Pearson Correlation Coefficient has been applied. It is a number between -1 and 1. The more its abstract would be close to 1; the stronger would be the relationship between the two variables. The results are provided in the following table.

Table 3
The results from Pearson Correlation Coefficient for third hypothesis

Independent variable	Mean Value	Standard error	Number of respondents	Correlation Coefficient	Significance Level
Review of evidences	63.3	01.1	150	190.0	02.0
Auditor asking from informed people	84.1	85.0	150	-022.0	793.0
Auditor's supposition	30.2	01.1	150	-047.0	572.0
Review of reports from past periods	04.3	15.1	150	-009.0	914.0
Using artificial intelligence systems	83.2	23.1	150	035.0	667.0

According to the above table, correlation between using artificial intelligence systems for fraud detection and usage level of artificial intelligence has not been significant in audit processes (significance level= 667.0). However, correlation

between review of evidences for fraud detection and usage level of artificial intelligence in audit processes has been significant. Calculated value of correlation coefficient between these two variables has been equal to 190.0 .Considering positive value of the variable, it can be concluded that there is a positive relationship between study of evidence for fraud detection and usage level of artificial intelligence in audit processes.

Testing the forth hypothesis : There is a significant relationship between usage made of artificial intelligence to collect audit data and importance level of effective items on fraud detection in audit (review of evidences, asking informed people, auditor's supposition, review of reports from past periods, using artificial intelligence systems).

To study this hypothesis, Pearson Correlation Coefficient has been applied. It is a number between -1 and 1. The more its abstract would be close to 1; the stronger would be the relationship between the two variables. The results are presented in the following table:

Table 4
The results from Pearson Correlation Coefficient for third hypothesis

Independent variable	Mean Value	Standard error	Number of respondents	Correlation Coefficient	Significance Level
Review of evidences	63.3	01.1	150	068.0	407.0
Auditor asking from informed people	84.1	85.0	150	-028.0	734.0
Auditor's supposition	30.2	01.1	150	013.0	878.0
Review of reports from past periods	04.3	15.1	150	152.0	064.0
Using artificial intelligence systems	83.2	23.1	150	039.0	639.0

According to the above table, correlation between using the artificial intelligence systems for fraud detection and usage level made of artificial intelligence to collect accounting data has not been significant (significance level= 639.0).

Discussion

Based on the studies, using artificial intelligence is effective on quality improvement of audit work (16, 22). Considering expansion of data, data analysis just by the auditor and no other technical assistance can lead to increase of error and ambiguities as well as wrong decision making. Also, performing repeated and time consuming works by auditor will finally lead to reduction of efficiency of the auditor (17). As far as auditing is always accompanied by data analysis; using artificial intelligence would be useful as a component leading to better efficiency of the auditor. So, the research has been performed to the aim of studying effect of artificial intelligence technology on quality of audit work in Iran.

The results showed that technology of artificial intelligence is effective in accounting data collection and helps facilitating the work done by auditors. Such result is in line with that of research performed by Moffit et al. (2). This way, analyzing the ledger or financial reports in audit work or any manual effort made in this respect can be minimized by artificial intelligence (23-24). The next research result has been the minor effect of applying artificial intelligence in reducing audit cost which has been in line with that of the study performed by Law and Shen (25)

Contrarily, it was estimated that technology of artificial intelligence has not much effect in fraud detection which unbelievably is in contradiction with the results from researches performed and the importance of such technology in fraud detection (2). This shows that artificial intelligence structure is not developed in companies. Also, it is indicative of experts and managers' lack of experience in using artificial intelligence technologies in the audit field of Iran. Next important point from among those reasons ending to such result is lack of usage made of artificial intelligence in auditing, and Iranian experts and auditors not being assured of this new systems. They prefer manual methods of dealing with financial accounts and data analysis so that their levels of error would be decreased. It should be noted that this uncertainty about artificial intelligence does not include just Iranian auditors; but, it concerns all people in relation to all fields artificial intelligence is applied there (26). Fear from losing job is also one of the reasons mentioned by people against intelligent technologies; because, some of human tasks are done by artificial intelligence. Some of the low level occupational positions may be affected by artificial intelligence; however, humans and artificial intelligence are in fact completing each other. So, it has to be considered as an opportunity and not a threat (27-29). However, a professional auditor cannot be replaced with artificial intelligence. Moreover, we cannot just rely on artificial intelligence-based technology and not human force; because, system with no maintenance and supervision will be exposed to dysfunctionality that in turn would be leading to great losses (30). Therefore, to increase quality of audit work, using an expert in addition to artificial intelligence can be useful.

Of course, lack of experience in applying artificial intelligence technologies and also lack of data mining skills through these systems are affecting this. So, auditors have to dominate artificial intelligence technology's related skills and knowledge in addition to professional audit capabilities. In this respect, countries, companies, universities, people and other parties have to cooperated with each other so that problems resulted from applying artificial intelligence would be solved (22-25). In general, artificial intelligence has had positive effect on improvement of audit quality (31).

Conclusion

Nowadays, quick and precise access to financial information is the key criterion for progress of organizations. On the other hand, innovations in advanced technologies including artificial intelligence is of special importance in all scope of activities in today's world (32). Speedy growth of artificial intelligence technology and it being increasingly implemented in audit field has led to change of future of audit industry (33-35). Therefore, audit managers are required to use these new

technologies to achieve organizational goals and to promote quality of audit work. The research results showed that using artificial intelligence by managers and auditors studied in performing each of data analysis process; cost reduction; and, fraud detection is not of considerable help in more efficiency of them. The result is contrary to those of previous researches; and, the reason is the whole factors leading to our auditors not having tendency towards using artificial intelligence including lack of trust in new advanced technologies; lack of sufficient skill and knowledge in the field; and, lack of required investment to develop artificial intelligence by audit institutes.

Considering the effect of artificial intelligence in more efficiency of auditor's work (36-37) and improving quality of audit (25); our recommendation for audit institutes is increase of usage made of advanced technologies and creation of required motivation in their employees to use artificial intelligence, as well as in-service training to improve data mining skill of auditors.

Acknowledgments
The authors wish to acknowledge the assistance and support of Managers and auditors.

Funding sources
This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

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