

Data mining and its effects on the accounting and auditing profession: A LITERATURE REVIEW

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Abstract

As a result of recent developments in information technology, and given what accounting represents as a tool for providing and communicating information to the beneficiary parties, it has become necessary for them to keep abreast of developments in information technology and benefit from its tools. And think about it critically to measure its impact, and the main method was to review the literature that dealt with the accounting and auditing aspects, as the scope of the "literature review" was limited to studies related to the subject of the study during the period from 2011 to 2022, The focus was more on Arab studies that dealt with this subject. The study concluded that the (DM) method is of great importance in developing the accounting & auditing aspect through the use of (DM) methods and tools because of their importance in revealing knowledge and shortening time and effort, in addition to predicting companies' performance and estimating and discovering surrounding risks, which contributes to solving problems and helping In making appropriate decisions, the study recommended the necessity of adopting (DM) methods and tools as a tool for auditing customs operations and electronic payment operations, as they are accompanied by many problems and the lack of clarity of the control measures taken in them in the Iraqi environment.

Keywords: Data mining, Accounting, audit.



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Introduction

Accounting is a method for quantifying and disseminating financial data that represents the performance and statement of financial status of the firm. One of the most significant accounting practices that reflects the changes that have occurred in the accounting profession because of scientific, technological, and economic improvements is the generation of financial reports and the information they contain. This has led accountants to seek to increase the relative benefit of accounting information provided to current and potential investors, lenders, and other users of the information to provide a sound basis for information for dealers in financial markets to enable them to properly determine the prices of investments traded in these markets and to spread confidence among them in this information. To achieve this, the interest on the part of accountants has increased in exploring new fields and using modern methods that have multiple advantages and classification and predictive capabilities to reach information outputs characterized by high accuracy, by taking advantage of the role played by modern information technology in increasing the efficiency and effectiveness of accounting information systems (Abdul Ghaffar 2020).

Financial statement auditing is a challenging and specialized process. For the auditors who conduct these audits, the rising digitization and automation of transaction processing pose significant difficulties. When confronted with an ever-increasing volume of pertinent financial transactions processed automatically or semi-automatically by computer systems, new data analysis techniques offer the chance to enhance the audit of financial statements and overcome the limitations of traditional audit procedures (Werner et al, 2021).

In order to improve decision-making skills by transforming data into useful knowledge to gain a competitive advantage, the method of (DM) is a cutting-edge technical instrument that can handle a big amount of data to find the correlations between them. The method of (DM) has gained recognition from numerous organizations in recent years, drawing the attention of numerous writers and practitioners. The Institute of Internal Auditors has listed it as one of four priorities for scientific research, and the (AICPA) has listed it as one of the ten best technologies used for tomorrow (Obaidullah, 2016).

A procedural stage called mining has become necessary in order to extract specifications and relationships from the data and to provide new information that was not known in traditional information systems in order to provide information that aids in making good decisions. The concept of (DM) has become one of the modern concepts in the success of decision support systems in modern business organizations. In this new environment, information systems' role in terms of data has evolved to include cognitive practice as integrated systems that add new roles to their previous roles of providing vast information and knowledge that aid in better decision-making (Al-Shehadeh, 2013).

(DM) has also been characterized as techniques and instruments for delving into unexplored information, and it can be seen as a form of knowledge required to address particular issues in a certain subject. A decision model can be created to

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forecast and categorize the probable domain problem using (DM) methodologies (Lu & Chen, 2009).

(Heishan and Al-Saqour, 2022) believes that the method of (DM) is to explore the information hidden in that data to be used in all fields, as well as focusing on the importance of information stored in warehouses to be relied upon in solving problems and assisting in making appropriate administrative decisions, and the process of (DM) It is a successful process for analyzing huge amounts of data by converting it from mere information accumulated in the data warehouse and incomprehensible to carefully selected and valuable information that can be exploited and then used to improve the decision-making process.

The reasons that led to the increased interest in (DM), include the following (Manjula et. al., 2011) (Abdul Ghaffar, 2020):

- 1- The large volume of available data, and the necessity of analyzing and discovering this data, especially since it contains hidden information of high value.
- 2- Revealing meaningful models and rules and helping to solve many complex work problems.
- 3- Helping organizations to explore and focus on the most important information in the databases and to extract the information hidden there.
- 4- Building future predictions, and exploring behavior and trends, which leads to an easy decision-making process.

Data mining relies on four basic elements (Al-Fertas et al., 2015):

- 1- Data: It is facts, numbers, or texts that can be processed by a computer.
- 2- Information: It is the results extracted from the data processing process, which includes finding a relationship, comparisons, colleges, budgets, and rates.
- 3- Knowledge: It is the direct result of understanding the content of information, which adds value to it that can contribute to increasing the effectiveness of decision-making.
- 4- Data warehouses: They are specially designed to extract, process, represent, and present data in an appropriate manner for these purposes, and they store a huge amount of data that may be from different sources.

(DM) methods are characterized by general characteristics, including (Abul Fotouh, 2016):

- 1- The ability to deal with difficult problems (DM) methods aim at the automated discovery of useful information from a complex data set. These methods extract knowledge and use it to predict and search for unexpected data patterns from a complex database easily.
- 2- Automatic detection of unknown patterns, where (DM) methods learn to discover data patterns automatically, and this helps in detecting fraud and errors in transactions.
- 3- (DM) methods can deal with a large amount of data, and therefore it is considered one of the important advantages of these methods when performing the audit process.
- 4- Relatively high cost. Although (DM) methods are considered cheap at present, they are still somewhat expensive compared to other ready-made programs, given that

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users of these methods incur additional costs such as the cost of data preparation, the cost of data analysis, and the costs of training on the use which is relatively high.

- 5- (DM) methods discover important unexpected information hidden in accounting transactions.
- 6- The ability to learn, many (DM) methods are characterized by the ability to learn, as these methods gain experience from their previous mistakes, and then the quality of those models automatically improves.

The (DM) process uses several techniques, and the choice of one of them depends on the nature and size of this data, and one or more of these techniques can be used, as shown in the following: (Ali, 2018)

- 1- **Classification:** It depends on analyzing a group of data to form a new group based on common characteristics that can be used to classify future data, and includes many tools such as decision tree, nearest neighbor, and regression.
- 2- **Coupling:** It includes constant coupling relationships between a group of things in the database, i.e. the coupling between the occurrence of one event and the occurrence of another event.
- 3- **Results Analysis:** It is similar to a coupling, but it is related to time, as it deals with models that occur in a specific time sequence, that is, it deals with data that occur in separate cases.
- 4- **Clustering:** A descriptive technique that groups similar entities and puts dissimilar entities into different groups. It is used to group tools such as averages and neural networks.

Methodology

This paper aims to explore the opportunities presented by (DM) in accounting and auditing and to think critically about them to measure their impact. Focus more on Arab studies that dealt with this subject.

Literature review

The study (Rostami et al., 2011) aimed to use (DM) in the fields of accounting in companies and financial institutions, through the use of models to detect certain patterns in accounting fields and to discover irregularities, improper practices, potential fraud, and errors in the financial statements, which affects their quality. Negatively. The study concluded that the applications or strategies of (DM) and processing tools to verify the quality and integrity of the data lead to error correction and thus support the informational content of future financial statements and improve their quality.

The study (Hashem, 2013) aimed to test the ability of (DM) methods to support the auditor's opinion about the existence of material errors in the items of the financial statements, as well as the ability of the enterprise to continue. To analyze the data and extract the results, the study relied on the technique of neural networks and the technique of logistic regression, as they are two of the most important methods of (DM) that were used in most of the previous studies, which supported their use to test the objective of the study. The analytical method was used to test the study's hypotheses. The effect of both neural network technology and logistic regression technique on testing their ability to support the auditor's

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opinion. The researcher used the SPSS V 17 program for data analysis, which contains two techniques of logistic regression and neural networks, to test the hypotheses of the study by applying it to the industrial and service sectors, which constitute the study population of 71 industrial companies and 59 service companies for the period between (2008-2011). The results, the most important of which were the existence of significant differences between the application of the professional opinion of the auditor and the use of logistic regression about the presence of material errors in the financial statements using the items of the statements of financial position and income in the industrial sector or the services sector or in both sectors together. There are also significant differences between the application of the professional opinion of the auditor and the use of logistic regression about the continuity of the enterprise using financial ratios in the industrial sector, in the services sector, or both sectors together.

The study (Al-Bakri, 2016) aimed at trying to study the method of (DM) and the possibility of benefiting from it in developing the audit process in a way that helps to benefit from it various accounting fields. Useful for references. Each of them plays a positive role in developing the audit process and increasing efficiency and effectiveness. The study concluded that (DM) tools have an effective and important role in the field of finance and accounting, as they can classify and predict, and they are more used in the areas of predicting bankruptcy, continuity, and financial hardship. In addition to forecasting corporate performance, estimating credit risk, and discovering management risk, they are tools that help auditing increase the efficiency and effectiveness of the auditing process.

A study (Muhammad, 2016) aimed at improving the quality of financial reports by providing information about future cash flows as important information that benefits decision-makers, To take advantage of the role played by modern information technology in raising the efficiency and effectiveness of accounting information systems, the (DM) method was used as a modern method that has multiple advantages and classification and predictive capabilities, as it can reach correct outputs with high accuracy and promptly. The study concluded that the (DM) method and its various tools help expand the framework in which accounting operates, which increases the accuracy and relevance of the resulting accounting information, and the increase in accuracy leads to a difference in the resulting information compared to traditional models, and then this information becomes suitable for making investment decisions.

(Al Dafai, 2018) This study addressed a statement of the role of the (DM) method in assigning the external auditor's opinion about discovering fundamental errors in financial reports and their impact on audit quality. The external auditor's assessment On the other hand, the analytical method was used to test the study's hypotheses on a sample of companies listed on the Istanbul Stock Exchange, and the study's findings concluded that the use of prospecting method tools supports The external auditor's opinion on detecting fundamental errors in financial statements and whether the work is completed The study also revealed that the neural network technique outperformed others in terms of accuracy in the method of (DM).

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A study (Chahadah et al. 2018) aimed to explore the perceptions related to the use of (DM) techniques as a strategic management tool in the banking sector from the perspective of accounting and finance. To achieve this goal, a questionnaire was designed and distributed to a sample of 76 banking employees in Jordan who are directly involved in banking decision support systems units. The results showed that the use of (DM) techniques has positive importance in exchanging data with the internal environment as well as with the external environment of the bank. In addition, the results indicated the significant impact of (DM) techniques in supporting the administrative decision-making process in the areas of accounting and finance.

The study (Abu Al-Khair, 2019) sought to determine the extent to which the use of (DM) methods influences the auditor's estimates when reviewing financial statements. The study put a set of hypotheses to the test on a sample of Egyptian auditors in the field. Auditors were polled and the results were distributed. The study's findings indicate that auditors have adequate knowledge of the indicators mentioned in Auditing Standard No. (570), and the study concluded that the analytical procedures should be expanded to include appropriate (DM) methods to improve the accuracy of predicting the extent of material errors in financial statements.

A study (Abdul Ghaffar, 2020) aimed at attempting to analyze the use of the (DM) method in supporting the informational content of future financial lists, which leads to improving the level of quality of these lists in a way that benefits the users of the lists and financial information and reflects on the rationalization of investment and financing decisions for them and thus improving the efficiency of the financial market. And that the use of (DM) as a new technology can be used to support the informational content of future financial statements and increase the volume of investments by enhancing the efficiency of investment decisions. The results, the most important of which is that the preparation of future financial statements depends largely on the soundness of forecasts and financial estimates and the use of advanced scientific methods in the preparation process for future financial statements to reflect a more correct picture. Given that the accounting data is complex, which requires the use of a sophisticated scientific approach to analyze this data, it has a set of characteristics, the most important of which is the high predictive ability, taking into account the nature of the data and dealing with financial and non-financial variables. These properties are available in (DM) tools.

In order to assist the external auditor in finding errors in the financial statements and in reporting on the continuity of the economic unit when conducting the audit process, the study (Al-Shura and Al-Ghandour, 2020) set out to propose a framework for achieving integration between the systems analysis method and data mining techniques. Both inductive and deductive methods were employed in the investigation. And I discovered that using the systems analysis approach alone did not result in the external auditor's support, however using neural networks alone resulted in the external auditor's support by a little proportion. Additionally, the suggested framework may be used to integrate the systems analysis and neural network methods.

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The purpose of the study (Heishan & Falcons, 2022) was to determine the effect of implementing the (DM) method in achieving the quality of financial reports from the perspective of Iraqi external auditors. The descriptive analysis method (SPSS) was used to achieve the study's objectives and the study sample and population included audit offices for foreign affairs in Iraq. The study came to the conclusion that the quality of financial reports appears to be significantly influenced by the proper application of the financial (DM) approach and the use of accurate and trustworthy material. The findings demonstrated that the technique used to gather financial data and produce accurate financial reports will influence how well an audit is conducted.

A study (Tonye & Odogu, 2022) aimed to identify whether (DM) can reveal all trends, patterns, and errors in accounting records and reports and increase audit quality. It concluded that (DM) could effectively detect trends, patterns, errors, misrepresentations, and fraud in accounting records and reports. Moreover, that (DM) and audit quality are positively correlated, and that (DM) can improve audit quality and reduce the long audit expectation gap. The study recommended the need for auditors to become acquainted with (DM) skills, and auditing firms and shareholders should apply and insist on using (DM) in external auditing.

Results and discussion

The authors agree with the study of (Muhammad, 2016) and (Al-Bakri, 2016) that the diversity of the problems that the (DM) method is used to solve in the accounting field, where this method was used in the auditing profession, and, the numerous studies that dealt with it in largely detecting fraud as well as predicting opinion The auditor (conservative or not), assessing security in the business related to the subject matter of the audit, predicting the continuity of companies, and predicting financial failure This is in addition to predicting the level of disclosure of information in companies listed on the stock exchange, evaluating intangible assets, evaluating the quality of accounting data, and other accounting problems. (DM) can be used for references from the adoption of huge data warehouses in collecting the necessary data, as it helps to access data for Time analyzes discovery, and, decision-making.

And the use of neural networks does not contribute, through its highlighting of errors in the items of the financial position and income statements, to support the auditor's opinion about the existence of material errors in the financial statements using the items of the statements of financial position and income in the industrial sector or the services sector, or in both sectors together (Hashem, 2013). In addition to forecasting corporate performance, estimating credit risk, and discovering management risk, they are tools that help auditing increase the efficiency and effectiveness of the auditing process (Al-Bakri, 2016).

The authors agree with the study (Muhammad, 2016) that the (DM) method helps improve the quality of financial reports. There is a need to spread a culture of reliance on technology and knowledge of professionals with modern technology methods, as well as an attempt to familiarize investors with the minimum level of

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this technology, which facilitates interaction with it and understanding the results provided by various technology tools.

The authors also agree with the study of (Al Dafai, 2018) and (Al-Shura and Al-Ghandour, 2020) (Heishan and Al-Suqur, 2022) that the application of the exploration method tools depends on the opinion of the external auditor about discovering the fundamental errors in the financial reports, whether they are worked on together or individually. The study also revealed the accuracy of the neural network technique in the (DM) method more than others. In addition, the use of applications of both neural network technology and logistic regression technique supports the professional opinion of the auditor about the evaluation of the continuity hypothesis. There is a difference of opinion among the external auditors about the use of the mining method in the data warehouse, which affects the quality of the financial reports and thus is reflected in the quality of the audit process.

Thus, (DM) has become an important role in various fields, including the field of accounting, as it has been applied to banks, insurance companies, and commercial companies to provide deeper information about customers and then respond to their requirements, to determine profitability, ratio analysis, cost analysis, department productivity, and administrative fraud analysis, and to study the effectiveness of Business as a whole (Obaidullah, 2016).

The researcher agrees with the study (Rostami et al, 2011) (Obeid Allah, 2016) that in the accounting field, (DM) can be used in accounting fields in companies, financial institutions, tax authorities, and other government agencies that use data in the fields of accounting and taxes, through Using models to detect specific patterns in accounting fields, And discover irregularities, improper practices, questionable transactions, potential fraud and money laundering, (DM) applications, and data processing tools enable verification of the quality and integrity of data, including missing data, ledgers, and accounting entries related to suppliers, identifying such elements can lead to correcting errors, whether In pricing, dealing with savings, reducing double payment, or others.

Conclusion

The development of information technology in our current era and the accompanying emergence of many tools and methods, one of which is (DM) technology, which is one of the most important techniques in artificial intelligence operations. Most of the authors in several fields pushed to delve deeper into this technique, and one of the most important of these fields was accounting. The study concluded that the method of (DM) is of great importance in developing the accounting and auditing aspect through the use of (DM) methods and tools because of their importance in revealing knowledge and shortening time and effort, in addition to predicting companies' performance and estimating and discovering surrounding risks, which contributes to solving problems and assistance in making appropriate decisions. In addition, applying the (DM) method well works to increase the accuracy and reliability of the data. Through the above, this method can improve the quality of financial reports and increase the quality of the audit process. It also contributes to supporting management accounting and cost accounting by

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determining profitability, ratio analysis, cost analysis, and detecting administrative fraud. The study recommended the necessity of adopting (DM) methods and tools as a tool for auditing customs operations and electronic payment operations, as they are accompanied by many problems and the lack of clarity of the control measures taken in them in the Iraqi environment. In addition to trying to use (DM) methods in Iraqi tax institutions and benefiting from cloud computing operations for the purpose of creating solid databases and controlling tax accounting operations.

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