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The Effect of Employing Big Data Analytics on Enhancing External Audit Quality and Activating the Preventive Role of Fraud Detection in Iraqi Banks

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Abstract
The purpose of this research is to investigate the impact of using big data as an analytic tool to improve audit quality and prevent fraud; all while using modern technology to enhance audit processes and supervisory functions in Iraq's banking system. A Descriptive Analytic Research Approach was used to analyze the relationship between each variable studied and measure its' effects upon the Iraqi Banking System. To gather data a structured questionnaire was distributed to a sampling population of 120 employees working for Iraqi Banks. It was found that there are statistical impacts from Big Data Analytics (BDA) upon both Audit Quality and Fraud Detection. However, it was also discovered that BDA had a greater impact upon Fraud Detection than upon Audit Quality; indicating the potential to utilize advanced technologies to identify fraud risks and detect patterns of fraudulent activity earlier than traditional methods. Recommendations of this study include developing and enhancing digital systems of Iraqi Banks to support their transition into Digital Transformation, increasing usage of modern data analytics software by auditors/supervisors in auditing/oversight processes and expanding education/training programs for accounting and auditing professionals to increase the effectiveness of financial oversight processes, reduce the risk of fraud within the banking system and protect depositor interests.

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1. Introduction

Over recent decades there has been significant progress in development of global Information and Communication Technology (ICT) and the massive scale of the digital transformation. As a result, the amount of information generated from all forms of economic activity, finance, and administration is now at an historically unprecedented level. Due to the ability to capture and assess large volumes of information related to financial and economic activities; organizations across all sectors are now looking into how they can utilize data as a strategic asset to make better-informed decisions and improve organizational performance. The Banking Sector is among the most heavily impacted by new ICT's due to the high dependence on financial data, electronic systems, and digital transactions. Consequently, banks are embracing technology advancements that will enable them to develop enhanced regulatory and auditing mechanisms, and increase operational efficiencies. The utilization of Big Data Analytics represents one of the primary emerging technologies in recent years that has captured the attention of many researchers due to its ability to quickly and accurately process and analyze large amounts of varied data sets. This ability enables analysts to discover new and unanticipated relationships or patterns in the data being analyzed and provide a higher degree of predictive risk assessment and produce more accurate and dependable information supporting both administrative and regulatory functions. In relation to Auditing, Big Data Analytics also provides auditors with a means to significantly enhance their ability to conduct audits efficiently and effectively. This enhancement is realized by providing auditors with access to larger amounts of data than those provided through traditional auditing methodologies that rely upon limited samples.

Banks operating in Iraq are faced with growing challenges associated with increasing threats from financial fraud; increasing complexity in bank operations; and increased demands for greater transparency and reliability in financial reporting. Based on the current state of affairs, the application of traditional auditing methodologies may be inadequate to address the issues currently facing the banking industry today. Therefore, it is essential for banks to adopt modern technology solutions that will enable them to improve their auditing processes, while reinforcing their ability to prevent fraudulent activities.

Although interest in utilizing Big Data Analytics for Accounting and Auditing purposes has greatly increased over recent years, few applied studies exist evaluating the use of Big Data Analytics for enhancing External Audit Quality in the context of the Iraqi Banking Industry, particularly in terms of enhancing Fraud Detection Capabilities. Therefore, this research aims to identify the impact of using Big Data Analytics in enhancing External Audit Quality and enforcing the Preventive Role of Fraud Detection in Iraqi Banks. Furthermore, this research aims to define the nature of the relationship among the study variables in order to provide a scholarly and practical framework to support improvements to auditing and supervision practices in the context of the Iraqi Banking Environment.

2. Scientific Methodology and Literature Review

2.1. Scientific Methodology

2.1.1. Research Problem

The main challenge facing Iraqi banks in today's digital banking environment is an increase in the amount of data they are required to process as well as an increasing complexity of financial transactions for which they need to apply Big Data Analytics to make their supervising and auditing activities more efficient. However, despite rapid technological developments, many of these banks still use traditional or non-technological methods of auditing and fraud detection, a method that limits their potential to enhance the quality of external audits and exercise the preventive function of detecting fraudulent acts at an early stage. The main objective of this research study is based upon the above stated realities on two basic questions.

To what extent does the application of big data analytics influence the improvement of external audit quality in Iraqi banks?

How can the implementation of big data analytics lead to activate the preventive function of fraud detection in Iraqi banks?

2.1.2. Objectives of the Study

This study aims to achieve the following objectives:

1. To demonstrate the effect of big data analytics on raising external audit quality.
2. To measure the role of big data analytics in strengthening the preventive capacity for detecting financial fraud.
3. To clarify the nature of the relationship among the principal variables of the study within the Iraqi banking environment.

2.1.3. Research Hypotheses

The study rests on two main hypotheses to examine the relationships among variables:

1. There is a statistically significant relationship between the employment of big data analytics and external audit quality in Iraqi banks.
2. There is a statistically significant relationship between the employment of big data analytics and the activation of the preventive role of fraud detection in Iraqi banks.

3. Prior Studies and the Distinction of the Current Study

3.1. Literature Review

3.1.1. The Concept of Big Data:

The number of people interested in big data is increasing, creating an opportunity for industries to improve their products and services. However, this trend also brings some problems and challenges for industries. Therefore, there are many studies regarding to the trends of big data in today's world. As (Rahmadian *et al*., 2023), said big data has become one of the main factors driving the development of various innovations and developments across many areas. In addition to these [1], (Hezam *et al*., 2023) stated that "big data" has attracted the interest of researchers and practitioners in a wide array of fields, including accounting and auditing [2].

explain that big data can be defined as large volumes of information that have characteristics of variety, velocity, and veracity [3]. (Hamza *et al*., 2025) elaborated on the subject by defining big data as vast numbers of distributed, heterogeneous, and complex data sets collected from devices, sensors, web-based activities, and digital sources of all kinds present and will exist in the future. Moreover, as a result of being so voluminous and complex, big data was described as having amounts of data that are beyond what traditional relational databases or traditional data processing systems could manage [5].

According to (Herath *et al*., 2021) big data is associated with extremely high volumes of data that cannot be managed effectively due to its size [6]. Furthermore, (Dalwai and Tamanna *et al*., 2021) stated that big data is not just a matter of accumulating data, rather utilizing it properly; when volume, variety, and velocity are taken into consideration, the complexity of the data increases [7]. (Dewu and Yasser, 2019) emphasized that big data is composed of data that needs to be identified, retrieved, processed, stored and analyzed in order to be converted into useful information through sophisticated tools and software. Although there are numerous models describing how data proliferation is occurring; therefore, no universally recognized definition exists [8]; thus (Gamage, 2016) explains that big data can be understood as a huge amount of information in terms of quantity, speed, and type, which requires new types of processing to produce better decisions and greater insight [9].

The features that characterize big data are summarized as follows:

- **Volume:** Reflects the enormous magnitude of big data collections. Usually expressed in exabytes (EB) or zettabytes (ZB).
- **Variety:** Indicates that big data can be used in different ways depending on the context [10].
- **Velocity:** Velocity is divided into two parts: data flow velocity and data outflow velocity. If the inflow rate equals the outflow rate, then we can express the two values as a single velocity [11].
- **Veracity:** It involves managing and validating the quality of big data so as to guarantee the validity, coherence and trustworthiness of big data. Generally, big data is irregular or missing pieces.

- **Value:** Big data includes valuable information that need to be extracted from large collections. Therefore, extracting insights in a cost-efficient way and utilize them in areas like business intelligence and health care represent the biggest challenges for analyzing big data [12].

3.1.2. How Big Data Works

Analyzing big data presents considerable operational challenges due to the existence of data in multiple formats and the need to convert it into a unified form. The process can be divided into four main stages: data collection and storage, data pre-processing, data analysis, and data visualization [13].
Data Collection and Storage: This involves acquiring and storing data for subsequent use. Data are gathered from diverse sources, including sensors, social media platforms, and blogs, and may exist in structured, semi-structured, or unstructured forms.

- **Data Pre-processing:** Although pre-processing is a powerful instrument enabling users to manage and work with complex data, it can consume significant processing time [14].
- **Data Analysis:** Typically summarizes the enormous volumes of data that have been collected, stored, and managed. Analysis is performed to derive findings that inform sound decision-making, relying on various platforms, technologies, and programming languages [15].
- **Data Visualization:** Facilitates comprehension of complex data through formats such as charts, graphs, and dashboards

3.1.3. The Concept of External Auditing

The external audit process has assumed great importance given its objective of verifying the accuracy and integrity of financial records and information [16]. External auditing has been defined as an independent examination of an organization's financial statements and their accompanying disclosures by an external auditor, with the primary aim of expressing an opinion on the reliability of those financial statements in accordance with accepted auditing standards [17]. (Harb *et al*., 2024) characterize it as a structured process conducted by an independent party to issue a professional opinion on a given economic entity's financial data and communicate the resulting findings to relevant users [18]. The term "external auditing" was defined by (Oladejo *et al*., 2020) as a formalized procedure implemented through an unaffiliated party which reviews/evaluates financial reports, documentation and/or accounting records to provide an unbiased technical opinion regarding whether or not the subject company's financial reporting has been prepared accurately [19]. (Zamil & Abed, 2022) also define "audit quality" as the auditor's ability to identify errors/violations in the client's financial reports and ensure that such reports have been prepared according to widely-accepted principles and standards [20].
Auditing Financial Statements are vital to assuring the auditor is transparent and honest when compiling financial reporting information. The external auditing process operates based upon several fundamental tenets:

- **Integrity:** Auditors are expected to act with integrity; therefore, they will carry out audit procedures as guided by their conscience. Truthfulness is an ongoing attribute that must characterize auditors if they wish to maintain accountability toward their clients [21].
- **Independence:** An outside party must independently evaluate the client's financial statement(s); thus, the auditor cannot have any personal relationship with either management or employees that could potentially impact the auditor's evaluation of the financial statements. Auditors should operate as objective, neutral parties in their analysis of the client's financial condition [22].
- **Objectivity:** For auditors, objectivity means conducting the review process fairly and impartially, without pursuing personal or collective interests. Objectivity has a demonstrably positive influence on audit quality [23].
- **Reporting:** External audit reports summarize the findings reached by the financial accounts auditor, encompassing clarity and disclosure of any deficiencies or issues identified during the audit [24].

3.1.4. The Relationship Between Big Data Analytics and Audit Quality

The information technology landscape has undergone substantial change, and auditors have utilized IT tools in audit engagements since the entities they audit first began employing computerized systems to record their transactions [25]. A number of studies point to the positive influence of big data on accounting and audit performance. Financial monitoring tasks are expected to experience a substantial increase in data volumes as they shift toward data-driven audit analytics for examining financial accounting records; consequently, investors place their trust in institutions that place the highest priority on advanced audit quality [26].
(Alhawtmeh *et al*., 2025) argue that Big Data Analytics is an important tool in order to improve Audit Operations and reach the objectives of the Banking Sector, which confirms the increasing value of Big Data as an essential means in Financial Management and Auditing. However, there are several obstacles when adopting Big Data Analytics into auditing such as; data protection issues, the cost of implementing Big Data Analytics is very expensive, and the requirement for professional/ technical skills [27]. (Dempsey and van Dyk, 2023) recognize that although auditing has significant implications, it is also facing many problems globally [28].
(Harb *et al*., 2024) observe that most audit offices contracted with institutions seek to examine and evaluate data, reports, activities, and administrative procedures, and accordingly stress the importance of auditors continuously participating in training programs to keep abreast of developments within the profession [29]. Some studies have further highlighted that auditors should receive appropriate remuneration, since adequate resources enable them to conduct thorough audits capable of detecting material misstatements and errors in large financial datasets, thereby enhancing regulatory oversight of external audit operations and producing credible auditor reports on financial data [30]. The purpose of external audit quality is to enable the professional auditor to formulate an opinion aimed at verifying that financial statements have been prepared in accordance with a well-defined accounting

framework or set of principles [31].

(Zamil and Abed, 2022) contend that external audit quality is achieved through adherence to auditing standards and the application of a set of quality control considerations when auditing large financial datasets, along with detecting or curtailing the manipulation of misleading information in reports [32]. (Hezam *et al*., 2023) observe that the use of data analytics in auditing is growing steadily, and that data analytics in auditing holds immense potential for improving audit quality, reducing errors, increasing process transparency, and bolstering stakeholder confidence [32]. Most auditors have employed IT tools in their audit engagements since audited entities first began using computerized systems to record transactions [33].

(Ghazal *et al*., 2025) confirm that big data analysis enhances the profitability of external auditing owing to its advanced technical capabilities, provided that certain constraints—such as delays in data delivery—are taken into account [34]. (Friday and Imhanzenobe, 2020) note that prior to advances in information technology, most institutions recorded transactions manually, resulting in delayed preparation of monthly or annual reports, poorly organized filing systems that were difficult to navigate, and numerous errors, oversights, and misstatements in financial information. With the evolution of information technology, a shift occurred in how institutions record their transactions—now simpler and conducted through the auditing of IT systems—yielding timely preparation of monthly and annual reports with minimal human error, oversight, and misstatement [35].

3.1.5. Big Data Analytics and Early Fraud Detection

The explosion of digital financial transactions necessitates developing novel approaches to recognize and limit illicit activities [36]. Big Data has proven to be a unique tool to fight financial fraud and to provide fraud detection as well as to perform earlier detection. Big Data provides financial institutions with the ability to process large quantities of transaction data allowing them to identify patterns and to identify fraudulent activities better than previous methods allowed [37].

In addition to providing financial institutions with the ability to recognize potential financial issues earlier, big data analytics allows financial institutions to reduce the number of false positives in fraud detection and improve the accuracy of fraud detection. Several authors have noted that big data analysis helps in recognizing financial fraud by identifying abnormal transaction patterns and finding irregular employee behaviors [38].

(Shalhoob *et al*., 2024), based on data collection, found that big data analytics has the potential to increase error and fraud detection capabilities in six main areas: data quality and integrity, data privacy and security, real time monitoring and notifications, integration with internal controls, ethics, and human expertise [39]. (Dempsey and van Dyk, 2024) indicate that auditors typically face difficulties getting data needed for analysis from clients. Additionally, when auditors do get data needed for analysis, it is often incorrect or irrelevant [40]. (Shalhoob *et al*., 2024) believe that big data analytics is key to the discovery and prevention of fraud using advanced analytical techniques that allow for the use of data from several different sources including financial systems, transaction databases, internal and external sources, and unstructured information such as emails and social media posts. The inclusion of all these various types of data into one dataset allow for a much more detailed and accurate examination of how money is being used within an organization which will aid in discovering and preventing dishonest accounting practices [41].

Data quality is significant to fraud detection success (Batko *et al*., 2022), and big data analytics is very valuable in assisting with obtaining clean and correct data for analysis. Big data analytics uses complex algorithms that are able to locate inconsistent, duplicate, and outlier items in datasets which could indicate some type of fraud.[42]. As big data analytics improves the quality of data used in fraud detection, it also improves the accuracy of the models used for fraud detection, decreases the chances of false positives, and increases the efficiency with which an institution can assign their resources towards addressing serious cases. The focus on quality of data also increases the credibility of the fraud detection process itself [43].

3.2. METHODS

3.2.1. Descriptive Statistics Results

The descriptive statistics concerning the primary axes and their sub-dimensions (means, standard deviations and relative weights) will be presented here. Agreement levels on a scale established by the researchers have been taken into account.

3.2.2. Axis One: Employment of Big Data Analytics

The results for this dimension were obtained from 20 variables that comprise four sub-dimensions assessing the degree to which Iraqi banks apply big data analytics:

Table 1: Descriptive Statistics for Axis One Sub-Dimensions

Sub-Dimension	Mean	Std. Dev.	Relative Importance	Agreement Level	Rank
Technical Infrastructure (1.1)	3.895	0.273	77.9%	Agree	1
Digital Integration & Decision Support (1.4)	3.880	0.302	77.6%	Agree	2
Data Quality & Governance (1.2)	3.842	0.302	76.8%	Agree	3
Analytical & Predictive Capabilities (1.3)	3.817	0.332	76.3%	Agree	4
Axis One Overall	3.858	0.169	77.2%	Agree	—

The Table (1) indicates that there was no major variation in the means for all three sub-dimensions of technical infrastructure as it had the highest average at 3.895 and accounted for 77.9% of the total relative importance. This suggests that Iraqi banks have relatively good systems to support their big data analytics activities. The Digital Integration and Decision Support Sub-Dimension had the next highest average of 3.880 followed by the Analytical and Predictive Capabilities Sub-Dimension which has the lowest average of 3.817. Therefore, the areas related to these two latter sub-dimensions are underdeveloped comparatively to the other two sub-dimensions. Overall, the means for Axis One were averaged at 3.858 with a standard deviation of 0.169 and a relative importance of 77.2%, indicating that most of the respondent agree on employing big data analytics in Iraqi Banks.

3.2.3. Axis Two: External Audit Quality

Axis Two includes twenty measurement items regarding the quality of external audits in Iraqi Banks from perspectives such as; Procedural Efficiency, Evidence Reliability, Risk Assessment and Report Quality.

Table 2: Descriptive Statistics for Axis Two Sub-Dimensions

Sub-Dimension	Mean	Std. Dev.	Relative Importance	Agreement Level	Rank
Audit Evidence Quality & Reliability (2.2)	3.895	0.246	77.9%	Agree	1
Audit Report Reliability (2.4)	3.865	0.279	77.3%	Agree	2
Effectiveness of Audit Risk Assessment (2.3)	3.863	0.285	77.3%	Agree	3
Audit Procedure Efficiency (2.1)	3.852	0.326	77.0%	Agree	4
Axis Two Overall	3.869	0.164	77.4%	Agree	—

The results from the table (2) demonstrate that all of the sub-dimensions for Axis two are rated as "agree". The sub-dimension related to the quality and reliability of audit evidence has the highest mean of 3.895, while the sub-dimension of audit process efficiency is the lowest with a mean of 3.852. There is a relatively small gap of 0.043 between the highest and lowest means. This indicates that there is a high degree of similarity among respondent ratings regarding various aspects of the external auditing quality. The average for this axis was 3.869 and it had a standard deviation of 0.164. It also had a percentage of relative importance of 77.4%.

3.2.4. Axis Three: The Preventive Role of Fraud Detection

Axis two includes twenty questions which evaluate how effectively Iraq's commercial banks have employed digital analytic tools to detect and mitigate financial fraud.

Table 3: Descriptive Statistics for Axis Three Sub-Dimensions

Sub-Dimension	Mean	Std. Dev.	Relative Importance	Agreement Level	Rank
Continuous Digital Monitoring (3.3)	3.860	0.297	77.2%	Agree	1
Preventive Response & Risk Reduction (3.4)	3.823	0.350	76.5%	Agree	2
Effectiveness of Early Fraud Detection (3.1)	3.817	0.338	76.3%	Agree	3
Fraudulent Pattern & Behavior Analysis (3.2)	3.812	0.323	76.2%	Agree	4
Axis Three Overall	3.828	0.182	76.6%	Agree	—

Three key results can be identified from table three: Firstly, the sub-dimension of "Continuous Digital Monitoring" ranked highest with a mean of 3.86. This is a positive indication that there is an evident commitment to implement a real-time surveillance of banking activities through digital means. Secondly, the lowest ranking sub-dimension was that of "Fraudulent Pattern & Behavior Analysis", which had a mean of 3.81. Thirdly, this shows that it may be possible for banks to enhance the development of their predictive behavioral analytics capabilities. Overall, the total axis mean was found to have been 3.82, with a standard deviation of 0.18 and a relative weight of 76.6 percent.

3.3. Testing the Study Hypotheses

There are two major hypotheses studied within this study, plus a number of related sub-hypotheses. To analyze the associations among variables, Pearson correlation was employed; however, to assess the relationship type, directionality and size of effect, simple linear regression analysis was also conducted. An alpha of.05 was selected as the basis for all statistical inference.

3.3.1. First Main Hypothesis

- **H0:** There is NO statistically significant association between big data analytical use and external audit quality in Iraqi Banks using an alpha value of. 05.
- **H1:** There IS a statistically significant association between big data analytical use and external audit quality in Iraqi Banks using an alpha value of.05.

Table 4: Results of Testing the First Main Hypothesis

Independent Variable	Dependent Variable	r	R^2	t-value	df	p-value	Decision
Big Data Analytics (M1)	External Audit Quality (M2)	0.240	0.057	2.681	118	0.008	Accept H1

The results from table (4) indicate that the correlation between the two variables were moderate and positive with an r = 0.240. In addition, a t-test was conducted where the calculated t-statistic was 2.681 with 118 degrees of freedom and a p-value of.008. Since p <.05, we can reject the null hypothesis and accept the alternative hypothesis. The R-squared value (.057) shows that 5.7% of the variance in external audit quality could be explained by the use of big data analytics. Although it may seem like a small amount, since there is statistical evidence that it is not due to chance and as the technology and infrastructures used by Iraqi banks continue to evolve, the relationship should grow stronger.

3.3.2. Second Main Hypothesis

- **H0:** Big Data Analytics does not have a statistically significant impact on utilizing fraud detection's preventative role in Iraqi Banks at a.05 significance level.
- **H1:** Big Data Analytics will have a statistically significant impact on utilizing fraud detection's preventative role in Iraqi Banks at a.05 significance level.

Table 5: Results of Testing the Second Main Hypothesis

Independent Variable	Dependent Variable	R	R^2	t-value	df	p-value	Decision
Big Data Analytics (M1)	Preventive Role of Fraud Detection (M3)	0.282	0.079	3.189	118	0.002	Accept H1

The results from the test in Table (5), showed a statistically significant positive correlation to be present between the two tested variables. In addition, the calculated value of the correlation coefficient was found to be r = 0.282. Furthermore, the calculated value of the t-statistic was determined to be equal to 3.189. A significance level of p = 0.002, less than.05, indicated that the t-statistic was sufficiently large to reject the null hypothesis. Lastly, the coefficient of determination (R^2 = 0.079) indicated that approximately 7.9% of the total variation in the relationship between fraud detection and the preventive role of fraud detection could be explained by the independent variable, big data analytics. Therefore, this hypothesis was found to be the most statistically significant of both main hypotheses in terms of the statistical significance and strength of the correlation coefficient indicating that fraud prevention has been affected more by the use of big data analytics compared to audit quality.

3.4. Simple Linear Regression Analysis

The simple linear regression equations enable us to provide additional information about the nature of the relationships we have identified through our correlation tests. Specifically, using these equations enables us to identify an "effect equation," to estimate the size of the effects we are studying, and to determine the explanatory power of each independent variable:

Table 6: Summary of Simple Linear Regression Models

Model	Independent → Dependent	R	R^2	Adjusted R^2	B0	B1	F	p-value
1	M1 → M2	0.240	0.057	0.049	2.972	0.233	7.186	0.008
2	M1 → M3	0.282	0.079	0.072	2.658	0.303	10.170	0.002

The results in Table (6) indicate the following:

- Model 1 (M1 → M2): The regression equation Y = 2.972 + 0.233X indicates that each unit increase in the degree of big data analytics employment is associated with an increase of 0.233 in external audit quality. The F-value reached 7.186, which is statistically significant (p = 0.008).
- Model 2 (M1 → M3): The regression equation Y = 2.658 + 0.303X indicates that each unit increase in big data employment is associated with an increase of 0.303 in the preventive role, the highest regression coefficient across both models. The F-value reached 10.170, which is statistically significant (p = 0.002).

3.5. ANOVA for Regression Models

The following tables present the variance analysis for each regression model:

Table 7: ANOVA for Regression Model 1 (M1 → M2)

Source of Variance	Sum of Squares (SS)	df	Mean Squares (MS)	F-value	p-value
Regression	0.183	1	0.183	7.186	0.008
Residuals (Error)	3.012	118	0.026	—	—
Total	3.195	119	—	—	—

As shown in Table (7), the big data analytics employment regression model used to measure the impact of big data analytics employment on the quality of external audits is significant. With an F-statistic value of 7.186 at p <.05 (or less than.05) or p = 0.008, the model's validity has been established as well as its ability to demonstrate the relationships between these two variables. Furthermore, this study also showed that some of the variance in the quality of external audits could be explained using big data analytics adoption levels; therefore, it was determined that there was support for the first primary hypothesis and confirmed that digital transformation will enhance external auditing processes.

Table 8: ANOVA for Regression Model 2 (M1 → M3)

Source of Variance	Sum of Squares (SS)	df	Mean Squares (MS)	F-value	p-value
Regression	0.312	1	0.312	10.170	0.002
Residuals (Error)	3.618	118	0.031	—	—
Total	3.930	119	—	—	—

The evidence in Table (8), reflects a high statistical significance of the regression model as an examination of the impact of big data analytics on fraud detection's preventive function, which has a value of F=10.170 and p-value = 0.002. This result provides some assurance for the power of the model in demonstrating relationships between the two variables. In addition, this finding indicates that using big data analytics will have a positive influence upon enhancing prevention and supervision systems in Iraq's banking industry; it allows for identifying unusual patterns; reduces the risk of being exposed to fraudulent financial practices.

4. Conclusions

Based upon the findings from this research's statistical analysis, the following conclusions can be made:

1. The results of the study show that Iraq's banks have an acceptable degree of technology for the implementation of big data analytics in bank management and external

audits.
2. There was a statistically significant correlation between the usage of big data analytics and the improvement in quality of the external audit, which indicates how important it is to enhance the efficiency of audit process through digital analytics, and increase the dependability of results.
3. The statistical test showed that big data analytics contributes to increasing the preventive aspect of detecting financial fraud in Iraq's banks.
4. The study demonstrated that the influence of big data analytics on preventing financial fraud was greater than its influence on improving the quality of external audits; demonstrating how significantly analytical technologies can identify abnormal behavior or transactional trends.
5. The study found that there is a need to improve the analytical and forecasting capacity of Iraq's banks (the lowest of all the dimensions) ، because this area has been identified as one of the areas needing most development.
6. The study confirmed that the technological and digital transition and utilization of contemporary data analytic methods are crucial factors to enhance both the supervision and auditing conditions inside the Iraqi banking system.

Recommendations

The findings of this study suggest several recommendations:

1. Iraq's banks must continue to enhance their technical infrastructure so they may efficiently utilize big data analytics as much as possible.
2. Iraq's banks should be motivated to implement modern digital systems and smart analytical systems into their processes related to external audits and financial regulatory oversight.
3. Training programs and certification courses for auditors and accountants will need to be implemented to provide them with knowledge and skills related to using big data analytics software and the applied uses of these types of software in detecting financial fraud.
4. Continuous digital monitoring systems will need to be designed by each bank so that they may monitor potential suspicious activity early on to prevent increased financial risk.
5. A focus needs to be placed on developing large databases and enhancing database quality and governance so that banks have access to correct and dependable data that will enable them to make better informed decisions.
6. Both regulatory bodies and Iraqi banks should work together to create and promote digital transformation models and implement new technologies to enhance the quality of audits and build trust in the accuracy and completeness of financial reports.

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