



The designer of the comprehensive model to detect financial fraud in government and private organizations using the database

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ABSTRACT

This study aims to develop a robust model for detecting fraudulent financial reporting within organizations, a critical area of concern highlighted by the Society of Fraud Examiners. Fraudulent financial reporting is one of three primary categories of fraud, alongside asset misappropriation and corruption, each with distinct characteristics. The focus of this research is on detecting fraudulent financial reporting, which involves the intentional manipulation or misrepresentation of financial statements to deceive stakeholders. Drawing on theoretical frameworks and existing literature, this paper identifies key factors influencing fraudulent reporting, including internal controls, organizational culture, managerial ethics, and technological tools. A mixed-methods approach is employed, integrating expert interviews and quantitative analysis using Structural Equation Modeling (SEM) and Confirmatory Factor Analysis (CFA) to validate the proposed model. The findings emphasize the importance of strong internal controls, transparency, and regular employee training in mitigating the risk of fraudulent reporting. The model's validity is confirmed through various goodness-of-fit indices, demonstrating its potential as an effective tool for fraud detection. This research provides practical insights for organizations seeking to strengthen their financial oversight and reduce the risk of fraudulent financial reporting, offering a valuable framework for both academics and practitioners. Further studies could explore the application of this model across different sectors and regulatory environments.

Keywords: comprehensive model, financial fraud

1. Introduction

Fraud, in various forms, has become a critical concern in financial markets worldwide, including the Tehran Stock Exchange and the foreign exchange market. In recent years, financial fraud has severely impacted both private and government institutions, leading to significant losses for investors and damaging the credibility of national economies. Fraud in capital markets can manifest as fraudulent financial reporting, misappropriation of assets, and corruption, as outlined by the Association of Certified Fraud Examiners (ACFE). These forms of fraud create information asymmetry and conceal vital financial data, undermining investor confidence and economic stability. Historically, fraud has been driven by an inherent human tendency to exploit opportunities for personal gain. As businesses and governments increasingly rely on financial and accounting information for decision-making, the need for effective fraud detection methods has intensified. With the advancement of accounting and financial complexities, fraud detection, and auditing have gained paramount importance. Traditional methods, such as forensic accounting and audits, are essential, yet they often fall short in addressing the evolving and sophisticated nature of fraud. The fraud triangle (Cressy, 1973) identifies three key factors that contribute to fraud: pressure, opportunity, and rationalization. Fraud can occur in both private and public sectors, not as distinct categories but as overlapping risks. In this context, financial fraud is defined as the illegal use of information or financial manipulation for illegitimate benefits, which can occur through various means such as embezzlement, reporting violations, and corruption. According to the ACFE, these three types of fraud — fraudulent financial reporting, misappropriation of assets, and corruption can occur in any organization, whether public or private. Several fraud detection methods exist, from traditional audits to more modern techniques using machine learning and data mining. The MetaFraud framework (Abbasi et al., 2012) is one such innovation, leveraging meta-learning to improve financial fraud detection. This approach outperforms existing methods by providing more accurate results and higher confidence scores, aiding stakeholders in decision-making. Other methods, such as the specialized detection techniques developed by Chen et al. (2019) for financial statement fraud, also aim to reduce investment risks and enhance benefits. These

new approaches represent significant advancements over conventional fraud detection tools, highlighting the necessity of integrating modern technologies into fraud detection practices. The research in question focuses on evaluating and applying these advanced fraud detection techniques, specifically tailored to the Tehran Securities Exchange. The necessity of this research arises from the increasing sophistication of fraud, especially in emerging markets. Unlike traditional studies, which often focus on separate sectors or isolated fraud types, this research offers a holistic approach applicable to both private and government entities. By using machine learning and hybrid algorithms, the study aims to bridge the gap between older, less efficient methods and modern techniques, providing a more effective solution for detecting fraud.

This research offers innovation by applying a comprehensive, unified fraud detection method across both sectors, emphasizing machine learning's role in improving accuracy and efficiency. By examining both financial reporting fraud and asset misappropriation, the study contributes significantly to the body of knowledge on financial fraud detection, offering valuable insights into new, more effective tools for combating fraud in complex markets. Furthermore, the findings have the potential to enhance knowledge about modern fraud detection techniques, creating a basis for future research and practical applications in both private and public sectors.

2. Theoretical foundations of research

Fraud detection, investigation, and prevention are critical challenges for organizations due to the diverse nature of fraud. Fraud can take many forms, and each type requires distinct detection strategies and preventive measures. Given that every part of an organization has opportunities for fraud, it is important to understand the various classifications of fraud and how these classifications are detected. While frameworks may differ in how they categorize fraud, the Association of Certified Fraud Examiners (ACFE) provides one of the most valid and widely used frameworks for classifying fraud. This framework offers a structured approach that helps organizations categorize, detect, and prevent fraud.

It is essential that research in fraud detection refers to a precise and valid framework, such as the ACFE's, to avoid overlap and confusion. Fraud can be classified

into three primary categories across most well-established frameworks: fraudulent financial reporting, misappropriation of assets, and corruption. These three types of fraud can occur in any organization, and each has its own set of detection and prevention techniques. The focus of fraud detection research should be on these core categories, as they provide the foundation for understanding how fraud manifests within organizations and how it can be mitigated. Based on a defined framework, research can address fraud detection through hypothesis formulation and empirical investigation. The ACFE framework is an especially reliable reference for organizing research on fraud detection, as it provides clarity on the forms of fraud, methods of detection, and strategies for prevention.

2.1 Types of Fraud

Fraud can take many forms in organizations, and it is important to classify these types based on established frameworks to ensure consistency in research. Below are the three primary types of fraud according to the ACFE framework:

2.1.1 Fraudulent Financial Reporting

Fraudulent financial reporting involves the intentional manipulation of an organization's financial statements to deceive stakeholders, regulators, or investors about the company's true financial position. This type of fraud is often perpetrated by senior management and can include practices such as inflating revenue, understating liabilities, or falsifying other financial data. The goal is to present a more favorable financial picture than what truly exists, often to meet financial targets or mislead investors. Common techniques include recognizing revenue prematurely, recording fictitious sales, concealing debts, and omitting or distorting disclosures that could reveal the true financial status of the organization.

One of the most infamous examples of fraudulent financial reporting is the Enron scandal, which highlighted the severe consequences of such misconduct, including significant economic damage and the loss of public trust. To detect and prevent fraudulent financial reporting, organizations must establish robust internal controls, conduct regular and thorough audits, and prioritize transparency in their financial reporting practices. By doing so, they can reduce the risk of such fraud and ensure the integrity

of their financial statements, protecting both their reputation and the interests of stakeholders.

2.1.2 Misappropriation of Assets

Misappropriation of assets refers to the theft or misuse of an organization's resources for personal benefit. This type of fraud typically involves employees who divert company assets, such as cash, inventory, or equipment, for their own use. Unlike fraudulent financial reporting, which impacts external stakeholders, asset misappropriation directly damages the organization's financial health. The most common forms of asset misappropriation include the theft of cash through methods like diverting payments or falsifying transactions, as well as the theft of non-cash assets, such as inventory or equipment.

Various specific forms of asset misappropriation include payroll fraud, where employees falsify hours worked or create fictitious employees; expense reimbursement fraud, which involves inflating or submitting fraudulent expenses; and inventory theft, where goods or supplies are stolen for personal use. Detecting these fraudulent activities requires strong internal controls, including periodic audits, random inventory checks, and ensuring proper segregation of duties. The Association of Certified Fraud Examiners (ACFE) (2014) and KPMG (2013) emphasize that nearly half of economic crimes involve asset misappropriation, highlighting the critical need for organizations to implement robust systems to detect and prevent such fraud.

2.1.3 Corruption

Corruption is a form of unethical behavior where individuals or groups use their positions to gain unfair advantages, often through practices such as bribery, kickbacks, or conflicts of interest. This type of fraud can occur in both governmental and corporate environments, where decisions are influenced by personal gain rather than fairness or legal guidelines. Bribery typically involves offering or receiving money or gifts to secure favorable decisions or contracts, while kickbacks refer to returning a portion of a payment to the payer in exchange for preferential treatment. Conflicts of interest occur when individuals leverage their authority for personal benefit, often at the expense of the organization or its stakeholders. Corruption can severely damage an organization's reputation, erode public trust, and result in significant

legal and financial penalties. To prevent and detect corruption, organizations must implement strong ethical standards, ensure transparency, and conduct regular audits, which can help identify potential fraudulent activities early on. The Association of Certified Fraud Examiners (ACFE) framework offers a comprehensive approach to addressing fraud, dividing it into three main categories: fraudulent financial reporting, misappropriation of assets, and corruption. This framework is widely recognized for its effectiveness in both academic and practical settings, providing a clear structure for studying fraud and developing prevention strategies. In research based on the ACFE framework, hypotheses can be formulated to explore the factors contributing to fraud, assess the effectiveness of detection methods, and evaluate how fraud prevention strategies impact organizational performance. Key research questions might include identifying the best techniques for detecting asset misappropriation in financial institutions, exploring how senior management behavior influences fraudulent financial reporting, and examining the role of corporate governance in preventing corruption. The primary focus of such research should be on fraud detection, utilizing tools like data mining, anomaly detection, and forensic accounting to identify fraudulent activities and enhance organizational integrity.

3. Research Community

The research community for this study consisted of specialists and experts with significant experience and knowledge in the relevant field. These individuals were selected based on their expertise in management, teaching, and professional practice, which were key to the study's objectives. The diverse backgrounds of the participants ensured a comprehensive understanding of the research problem. Participants were chosen for their capacity to provide in-depth insights into the core components of the model being developed. The community was characterized by a mix of seasoned professionals, ensuring the robustness and relevance of the data. Given the applied nature of the research, the specialists in this community were not only academic experts but also practitioners who applied theoretical knowledge in real-world settings. This blend of academic and practical perspectives allowed for the development of a model that was grounded in both theory and real-life experience. The inclusion of

experts from diverse professional backgrounds enriched the data collection process, providing a multi-faceted view of the topic under investigation.

3.1 Research Sample

The research sample was divided into qualitative and quantitative parts, each with distinct methods for participant selection. In the qualitative phase, snowball sampling was used to identify experts who could provide valuable insights. This method began with a small group of initial participants, who then referred other knowledgeable individuals. A total of 15 to 30 experts were interviewed in-depth until theoretical saturation was achieved, meaning no new themes were emerging. This ensured that the sample was representative of the perspectives needed to understand the research problem deeply. For the quantitative phase, the sample consisted of experts who were also part of the research community, ensuring consistency between the two phases. The data collection was conducted through a structured questionnaire, designed to quantify the relationships and components identified in the qualitative phase. The number of participants in the quantitative sample was calculated to achieve sufficient statistical power for confirmatory factor analysis (CFA) and structural equation modeling (SEM). This provided the necessary data to test the validity of the model proposed in the qualitative phase.

3.2 Method of Distributing the Measurement Tool

In the qualitative phase, data were collected through semi-structured interviews, which allowed for flexibility in exploring the perspectives of experts while maintaining focus on the research objectives. These interviews were conducted either face-to-face or via remote platforms depending on the availability and geographical location of the participants. The semi-structured format provided a balance between open-ended exploration and focused inquiry, enabling participants to share both structured and unstructured insights into the research topic. For the quantitative phase, a structured questionnaire was developed based on the findings from the qualitative interviews. The questionnaire was distributed using email and online survey platforms, ensuring broad accessibility. Participants were given a set time frame to complete the survey, with follow-up reminders sent to encourage

a high response rate. Initially, 150 experts were contacted, and 120 completed surveys were received, yielding a response rate of approximately 80%. This high response rate ensured that the data collected were reliable and representative of the broader expert community.

3.3 Sampling Method

For the qualitative part of the study, snowball sampling was chosen due to its effectiveness in accessing specialized experts within the field. This method allows for the identification of individuals with in-depth knowledge who may not be easily reachable through traditional sampling methods. By starting with a small group of key experts, snowball sampling enabled the researchers to gradually expand the sample to include a diverse set of perspectives, ensuring that a comprehensive range of viewpoints was captured until theoretical saturation was achieved. In the quantitative phase, convenience sampling was used to gather responses from experts already involved in the field of study. This approach was chosen to ensure that the respondents were knowledgeable about the research topic and its practical applications. Convenience sampling helped streamline the data collection process, enabling researchers to obtain a large number of responses quickly, while still ensuring that the participants were sufficiently experienced to provide valid input for the model testing.

3.4 Measurement Tool for Each Variable and Research Dimension

In the qualitative phase, semi-structured interviews were the primary measurement tool. These interviews were guided by a set of questions developed from existing literature and expert feedback, which helped ensure that key themes relevant to the study were explored. The interview protocol allowed for flexibility, enabling participants to share their unique perspectives while maintaining focus on the research objectives. The open-ended nature of the interviews provided rich, detailed data, which were later coded and categorized to identify key themes and variables. For the quantitative phase, a structured questionnaire was developed to measure the components identified in the qualitative analysis. The questionnaire included Likert-scale items to assess participants' agreement with statements related to each variable in the model.

The items were carefully designed to align with the theoretical constructs and to capture the key aspects of the research dimensions. The measurement tools were adapted from well-established instruments used in previous studies, ensuring both their validity and reliability for this particular context.

3.5 Reliability and Validity of the Research Tool

The validity and reliability of the research tools were rigorously tested throughout the study. For the qualitative phase, validity was ensured by expert validation, where the interview guide was reviewed by field experts to confirm that it adequately captured the key dimensions of the research. In the quantitative phase, the validity of the structured questionnaire was assessed using Confirmatory Factor Analysis (CFA), which tested whether the data supported the theoretical factor structure. The CFA results confirmed that the items accurately measured the intended constructs, ensuring strong construct validity. In terms of reliability, the study used Cronbach's Alpha to assess the internal consistency of the quantitative data. A Cronbach's Alpha value above 0.7 for all variables indicated good reliability. This analysis confirmed that the measurement tools were consistent in their ability to capture the key variables across different respondents. The combination of CFA for validity and Cronbach's Alpha for reliability ensured that the measurement tools were both accurate and dependable in capturing the intended dimensions of the research.

3.6 Demographic Statistics of Participants

Demographic data were collected from participants to provide context for the study's findings. In the qualitative phase, the sample consisted of an equal number of male and female experts (50% each), with ages ranging from 30 to 50+ years. This broad age range ensured diverse perspectives, capturing both younger experts and those with more extensive professional experience. Participants' roles varied, with an even distribution between managerial, teaching, and practical work experience, allowing for a comprehensive exploration of the research topic. In the quantitative phase, the sample was 54.2% male and 45.8% female, with a majority of respondents aged between 36-45 years (50%), followed by a smaller group aged 25-35 years (33.3%), and 46+ years

(16.7%). The sample also reflected a similar distribution of professional experience, with 41.7% managerial, 33.3% teaching, and 25% practical work experience. This diversity in demographic and professional backgrounds enriched the data, providing a broad representation of the expert community's views on the research topic.

4. Findings

In this section, the results of qualitative and quantitative analyses are comprehensively presented based on the data extracted from the research. The results obtained from the qualitative and quantitative analyses show that the proposed research model has been able to cover all aspects related to the detection of financial fraud in state and non - government companies. The connection between the qualitative and quantitative findings in this research is pivotal in shaping the comprehensive fraud detection model. The qualitative insights, derived from interviews with 20 experts and a detailed three-stage coding process (open, axial, and selective), provided the foundational understanding of key factors influencing financial fraud detection, such as accountants' characteristics, internal controls, financial evidence, and the legal environment. These qualitative findings informed the

development of measurable variables and constructs for the quantitative phase. In the quantitative analysis, confirmatory factor analysis and structural equation modeling (SEM) were employed to validate and quantify the relationships between these identified factors, ensuring that the theoretical constructs from the qualitative phase translated into robust statistical models. This integration of qualitative insights with quantitative validation helped create a more holistic and reliable fraud detection model, confirming the significance of the identified factors and their interrelationships within the structural framework.

4.1 Qualitative analysis and data coding

In the qualitative section, the data were analysed using the theoretical coding method, which included the stages of open, central, and selective coding. These analyses led to the identification of 17 main categories and 112 concepts, which are presented in Table (2). Some of the most important categories identified included organizational maturity, organizational factors, job factors, and accountant characteristics, and monitoring and control. These categories were extracted through in - depth interviews and were used as part of the final research model.

Table (1): Concepts and categories extracted from data coding

concept	category	row
<ul style="list-style-type: none"> ✓ to have motivation Consciousness and recognition correct and accurate from Conditions ✓ independence and neutrality ✓ Honesty and Honesty ✓ to have the mind the questioner and searcher ✓ to have trust to breath ✓ intelligence inherent ✓ Accountability ✓ preference benefits general to personal ✓ ability understanding view (process inference thoughts, feelings and concerns others) ✓ ability solve Problem (ability identification relationships, interpretation data and reasoning analytical) ✓ ability understanding right from Rules and Regulations and Subjects 	puberty organizational	1
<ul style="list-style-type: none"> ✓ ability understanding right from Evidence and identification evidence incompatible with other Evidence ✓ ability diagnosis intentional to be Distortions identification done ✓ experience General (experience work to title accountant) ✓ experience specialized (for sample experience in one industry special) ✓ experience directly accountant in encounter with cheating ✓ experience indirect acquisition done from through Education Subjects related to cheating ✓ knowledge and Consciousness General (magazine knowledge Accounting and audit) ✓ knowledge specialized ✓ knowledge Global (knowledge acquisition and work general) ✓ knowledge and Consciousness in especially cheating 	Agents organizational	2
<ul style="list-style-type: none"> ✓ Consciousness from Rules and Regulations ✓ Consciousness Accountants from responsibility self in communication with cheating 	Agents job	3

concept	category	row
<ul style="list-style-type: none"> ✓ tendencies political people ✓ worry from reaction society and profession ✓ mastery to Standards accounting, audit and ritual behaviour professional 		
<ul style="list-style-type: none"> ✓ to have hesitation professional ✓ compliance ritual behaviour professional ✓ compliance Standards Accounting ✓ do Reviews necessary in acceptance and choice Accountants ✓ acquisition recognition enough from Accountants and the environment it, from sentence Controls internal 	Features accountant	4
<ul style="list-style-type: none"> ✓ Existence Supervision on Members Team Accounting ✓ Budgeting when suitable and enough ✓ adjustment suitable program Accounting and Tests Accounting in encounter with Agents danger cheating ✓ in opinion catch element Unpredictability in choice nature, Timing execution and amount methods Accounting ✓ identification and Evaluation Incentives / pressures for to commit cheating ✓ identification and Evaluation opportunities to commit cheating ✓ identification and Evaluation Attitudes / justifications for to commit cheating 	Supervision and Control	5
<ul style="list-style-type: none"> ✓ usefulness types different Evidence Accounting for discover cheating ✓ Existence procedure suitable for create Hypotheses cheating ✓ negotiation between Members team finance ✓ attention to Distortions discover done in Audits previous ✓ review areas with danger up, especially If from opinion amount low Importance to be ✓ classification danger cheating in in line triangle cheating ✓ use from Ratios finance determine done in studies, for prediction cheating 	Evidence and Documents	6
<ul style="list-style-type: none"> ✓ Education acquisition skills independence and neutrality ✓ Education Importance independence in process reporting ✓ Education Accountants to meaning confidence from Consciousness responsibility self in communication with cheating ✓ Education Accountants in relationship with identification Agents danger cheating and how Occurrence cheating ✓ Education Accountants direction Acquaintance with Controls internal important and basic 	Education and learning	7
<ul style="list-style-type: none"> ✓ support from Accountants ✓ Consciousness ratio to Conditions effective on performance Accountants ✓ Existence Controls internal effective ✓ Existence System Control quality effective ✓ Existence System supervisory and Actions disciplinary effective ✓ acquisition notification to opportunity from performance Accountants 	Controls internal	8
<ul style="list-style-type: none"> ✓ Existence designs encouragement effective ✓ waiting review and Inspection by Institutions supervisor ✓ to have process suitable for Employment Accountants ✓ to have security job Accountants ✓ to give Rights and Benefits suitable and reasonable to Accountants ✓ behaviour fair with Accountants 	Agents motivational	9
<ul style="list-style-type: none"> ✓ Existence the environment work suitable for Accountants ✓ big to become economy Accounting ✓ access Accountants to Banks Information ✓ to have tools enough for Accounting ✓ to employment persons with qualification professional ✓ investment enough in Accounting and finance ✓ Existence culture Responsiveness and response 	provide making Conditions execution	10
<ul style="list-style-type: none"> ✓ behaviour fair with Staff ✓ the environment work suitable for Staff ✓ acquisition notification to time from performance Staff ✓ Existence System supervisory and Actions disciplinary effective 	the environment work suitable	11
<ul style="list-style-type: none"> ✓ Separation ownership from Management ✓ Consciousness and knowledge Managers company ✓ to have experience enough Managers ✓ Absence conflict company with Issues political 	transparency	12

concept	category	row
<ul style="list-style-type: none"> ✓ Absence included Regulation to be Products Company (for sample from opinion pricing or Distribution it) 		
<ul style="list-style-type: none"> ✓ the environment economic unhealthy ✓ government to be the environment economic ✓ threat stability or profitable finance to the reason Conditions economic ✓ decline a lot demand and increase Bankruptcies ✓ was not Institutions supervisory independent ✓ was not Rules and Regulations in relationship with Actions disciplinary and Punishments effective ✓ Absence notification Institutions supervisory in especially Cases cheating face data ✓ Rules and Regulations complicated ✓ Rules and Regulations insufficient ✓ Rules and Regulations numerous and a lot ✓ change frequent Rules and Regulations ✓ Requirements new legal and Accounting 	Agents legal	13
<ul style="list-style-type: none"> ✓ Existence fields corruption in the country ✓ Absence Existence Support legal from Accountants ✓ small to be economy Accounting ✓ Absence investment enough in Accounting 	Agents environmental	14
<ul style="list-style-type: none"> ✓ the environment cultural ✓ Absence Existence Culture Responsiveness and response ✓ Absence sensitivity society and profession to Actions Auditors and Companies ✓ Ignorance shareholders ✓ demanding not being shareholders ✓ Absence feeling the need to audit by shareholders 	Agents cultural	15
<ul style="list-style-type: none"> ✓ level Importance in Accounting ✓ Documentation suitable ✓ Counselling with Managers and Experts special cheating for decision making and presentation Results ✓ use from Experts such as Experts legal and Technology Information ✓ use from Instructions bright for Evaluation danger fraud, discover cheating and how encounter with it ✓ able defence to be Report Accounting 	growth organizational	16
<ul style="list-style-type: none"> ✓ Existence mechanisms sovereignty corporate effective ✓ Existence Controls internal effective ✓ Existence Committee audit effective ✓ Existence unit audit internal effective ✓ Absence ability Management for Below foot to put Controls ✓ Existence System Accounting and reporting finance suitable 	Promotion skills job	17

One of the important points in this section was the identification and classification of extracted concepts in the form of different categories. Table (3) shows that concepts related to the category of strategies include two important parts: suitable working environment and transparency. For example, a suitable

work environment includes concepts such as fair treatment of employees and the existence of an effective monitoring system that can be effective in improving the performance of organizations and reducing fraud.

Table (2): category classification concepts to the category Strategies

Concepts	Categories
<ul style="list-style-type: none"> ✓ behaviour fair with Staff ✓ the environment work suitable for Staff ✓ acquisition notification to time from performance Staff ✓ Existence System supervisory and Actions disciplinary effective 	the environment work suitable
<ul style="list-style-type: none"> ✓ Separation ownership from Management ✓ Consciousness and knowledge Managers company ✓ to have experience enough Managers ✓ Absence conflict company with Issues political ✓ Absence included Regulation to be Products Company (for sample from opinion pricing or Distribution it) 	transparency

Also, in the diagram (1) the category of categories The strategies are visible. In addition, the conditions and environmental factors were also examined, which are divided into four main categories of education and learning, internal controls, and stigma factors in Table

(4). They have been classified as the provider of the conditions. These factors show that in order to deal with fraud in companies, attention should be paid to the development of employees ' skills and the creation of strong internal controls.

Table (4): category classification Concepts to the categories of the substrate

Concepts	Categories
<ul style="list-style-type: none"> ✓ Education acquisition skills independence and neutrality ✓ Education Importance independence in process reporting ✓ Education Accountants to meaning confidence from Consciousness responsibility self in communication with cheating ✓ Education Accountants in relationship with identification Agents danger cheating and how Occurrence cheating ✓ Education Accountants direction Acquaintance with Controls internal important and basic 	Education and learning
<ul style="list-style-type: none"> ✓ support from Accountants ✓ Consciousness ratio to Conditions effective on performance Accountants ✓ Existence Controls internal effective ✓ Existence System Control quality effective ✓ Existence System supervisory and Actions disciplinary effective ✓ acquisition notification to opportunity from performance Accountants 	Controls internal
<ul style="list-style-type: none"> ✓ Existence designs encouragement effective ✓ waiting review and Inspection by Institutions supervisor ✓ to have process suitable for Employment Accountants ✓ to have security job Accountants ✓ to give Rights and Benefits suitable and reasonable to Accountants ✓ behaviour fair with Accountants 	Agents motivational
<ul style="list-style-type: none"> ✓ Existence the environment work suitable for Accountants ✓ big to become economy Accounting ✓ access Accountants to Banks Information ✓ to have tools enough for Accounting ✓ to employment persons with qualification professional ✓ investment enough in Accounting and finance ✓ Existence culture Responsiveness and response 	provide making Conditions execution

4.2 Quantitative Analysis and Evaluation of the Proposed Model

In the quantitative phase, Structural Equation Modeling (SEM) and Confirmatory Factor Analysis (CFA) were used to assess the validity and reliability of the research model. These statistical methods were chosen to ensure that the data align with the theoretical structure proposed in the study. CFA was used to test the measurement model and confirm the relationships between the observed variables and the latent constructs. SEM was then used to evaluate the structural relationships between the constructs of the model, providing insights into the direction and magnitude of these relationships. The results were evaluated using several fit indices to assess how well the model fits the collected data. The goodness of fit indices shown in Table 5 demonstrate that the model fits the data at a desirable level. For instance, the RMSEA value of 0.038 indicates a good fit, as it is below the threshold of 0.08. Similarly, the CFI value

of 0.90 suggests that the model is a good representation of the data, as it is above the acceptable threshold of 0.90. Other indices, such as the NFI (0.93), NNFI (0.91), and IFI (0.96), also confirm the model's suitability. These fit indices are essential for ensuring that the structural and measurement models are appropriate for the data.

Table (5): Examination of Goodness of Fit Indices

Fit Indices	Good Result	Research Values	Great Values	Suitable Values
RMSEA	Good Fit	0.038	≥0.08	≥0.1
NFI	Good Fit	0.93	≤0.95	≤0.9
NNFI	Good Fit	0.91	≤0.95	≤0.9
CFI	Good Fit	0.90	≤0.95	≤0.9
IFI	Great Fit	0.96	≤0.95	≤0.9
GFI	Good Fit	0.91	≤0.95	≤0.9
AGFI	Great Fit	0.91	≤0.9	≤0.8
RMR	Great Fit	0.042	≥0.05	≥0.08
SRMR	Good Fit	0.072	≥0.05	≥0.08

4.2.1 Research Variables

The research variables were derived from the theoretical framework and identified through the qualitative phase. These variables include financial fraud detection, management efficiency, organizational behavior, and technological adoption. Each of these variables was conceptualized as a latent variable that could not be directly observed but was represented by multiple measurable indicators. These indicators were carefully chosen based on existing literature and expert input.

4.2.2 Research Measurement Section Report

The factor loadings indicate how strongly each observed variable is related to its corresponding latent variable. For example, the latent variable "financial fraud detection" had significant loadings on observable indicators such as fraud detection systems, audit procedures, and internal controls. The loadings for these indicators ranged between 0.70 and 0.85, indicating that the variables were strongly associated with their respective latent construct.

4.2.3 Reliability of Constructs

The reliability of each construct was evaluated using Cronbach's Alpha and Composite Reliability (CR). All constructs in the model showed Cronbach's Alpha values above 0.7, confirming their internal consistency. For example, the financial fraud detection construct had a Cronbach's Alpha of 0.85, suggesting high reliability. Additionally, Composite Reliability (CR) values exceeded 0.7 for all constructs, further confirming their reliability.

4.2.4 Validity of Constructs

The construct validity was assessed using Convergent Validity and Discriminant Validity. Convergent validity was supported as the average variance extracted (AVE) for each construct exceeded the threshold of 0.5. For example, the AVE for the technological adoption construct was 0.63, indicating good convergent validity. Discriminant validity was also confirmed through the Fornell-Larcker criterion, where the square root of the AVE for each construct was higher than the correlations between the constructs.

4.2.5 Landa, Gamma, and Beta Matrices

The Landa, Gamma, and Beta matrices were used to evaluate the direction and strength of the relationships between the variables in the model. The Beta coefficients indicate the strength of direct relationships between latent variables. For example, the beta coefficient for the relationship between technological adoption and financial fraud detection was 0.45, showing a moderate positive relationship. The Gamma matrix showed indirect relationships between variables, such as the effect of organizational behavior on financial fraud detection via management efficiency. These matrices helped confirm the proposed theoretical relationships.

4.2.6 Similarity Matrix

The similarity matrix provided insights into how similar the observed variables were in their relationships with the latent constructs. The correlations between the observable indicators were found to be highly consistent, suggesting that the model captured the underlying dimensions effectively.

4.2.7 Model Fit Report and Indices

As previously discussed, the model achieved a good fit with the data based on a range of fit indices, including RMSEA (0.038), CFI (0.90), and IFI (0.96). The NFI (0.93) and NNFI (0.91) also indicated that the model fits the data well. These indices collectively confirm that the model accurately represents the relationships between the variables and is supported by the data.

4.3 Plot of the Data Based on Research Constructs and Related Names

Figure 2 illustrates a Structural Equation Model (SEM) that visually represents the relationships between key variables influencing financial fraud detection, based on a mixed-methods approach. The model was developed by integrating both qualitative and quantitative data, with latent variables such as "Technological Adoption," "Management Efficiency," and "Organizational Behavior" representing the core constructs. These latent variables were identified through in-depth interviews and expert opinions during the qualitative phase. The arrows in the model indicate direct relationships, with Beta coefficients quantifying the strength of these links. For instance, the relationship between "Technological Adoption" and

"Financial Fraud Detection" is shown with a Beta coefficient of 0.45, suggesting a moderate positive influence. Additionally, indirect relationships, such as the influence of "Organizational Behavior" on fraud detection via "Management Efficiency," are captured in the Gamma matrix. The modeling process also ensures the clarity of the constructs and their relationships by presenting them in a coherent structure, starting from the identification of variables in the qualitative phase to the empirical testing in the quantitative phase using SEM. Factor loadings,

reliability tests, and validity checks, including the use of the Fornell-Larcker criterion for discriminant validity, were conducted to confirm the strength and reliability of each construct. The model's fit indices, such as RMSEA, CFI, and NFI, indicate that the theoretical structure fits well with the data, supporting the robustness of the proposed relationships between the variables. Through these rigorous steps, the model provides a clear and reliable representation of the factors that contribute to effective financial fraud detection.

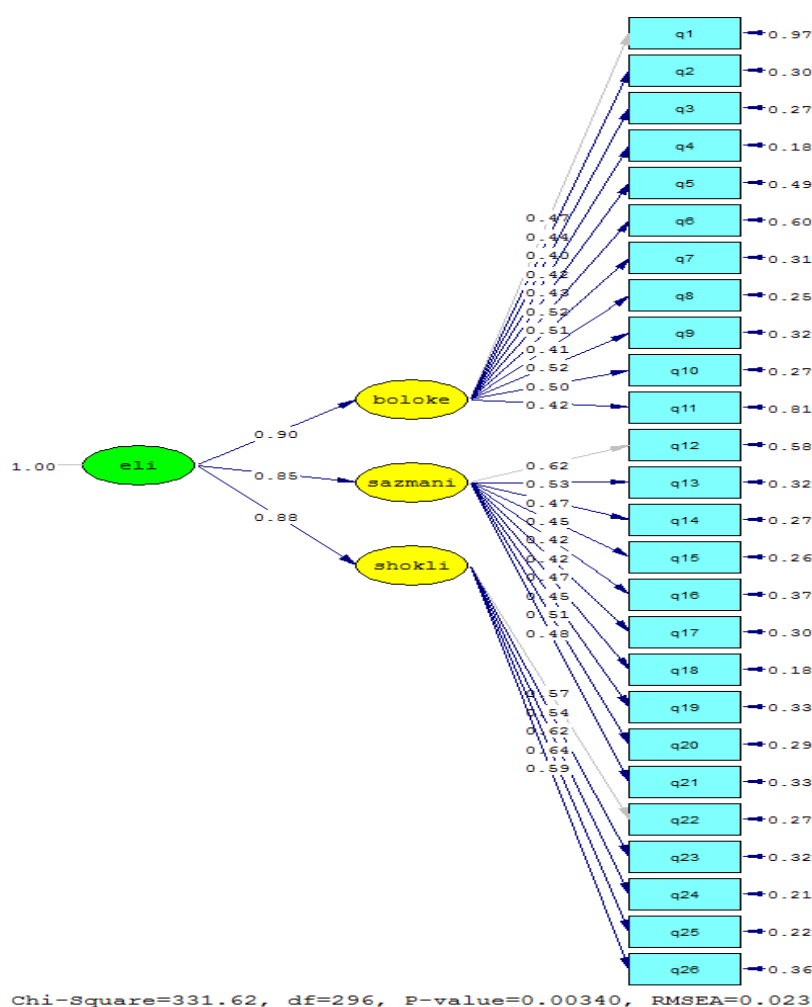


Fig (1): Model measurement Variable Conditions Ali in mode estimate Standard

Figure 2 presents a measurement model that represents the relationships between the latent variables and their associated indicators in the context of financial fraud

detection. In this figure, the latent variable "Financial Fraud Detection" is influenced by several observable indicators, such as fraud detection systems, audit

procedures, and internal controls, as depicted by the arrows leading from these indicators to the latent variable. These arrows indicate how strongly each indicator is related to the latent construct, with factor loadings (values) showing the strength of these relationships. High factor loadings suggest a strong association between the latent variable and its observed indicators. Additionally, the figure illustrates the significance of the relationships by including the t-values associated with each path in the model. For instance, a path with a t-value greater than 1.96

(typically indicating statistical significance at the 95% confidence level) suggests that the relationship between the corresponding variables is meaningful and significant. This model not only helps in assessing the importance of each component of financial fraud detection but also provides a structured way to understand the relative influence of technological, managerial, and procedural factors on fraud detection systems. The clarity of these relationships is crucial for refining fraud detection models and implementing more effective anti-fraud measures in organizations.

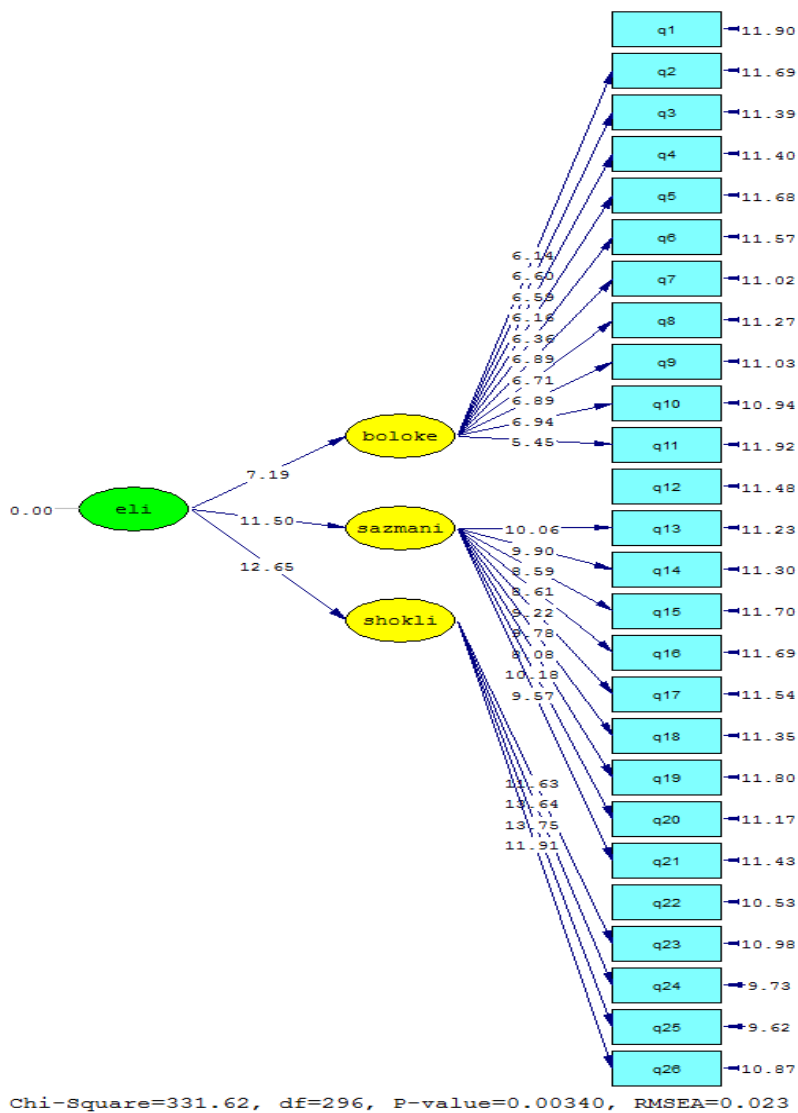


Fig (2): Model measurement Variable Conditions Ali in mode meaningfulness

4.4 Descriptive Statistics of the Study Variables

Descriptive statistics for the research variables are summarized in Table 6. The table provides the mean, standard deviation, and range of scores for each variable. For example, the mean for the "financial fraud detection" variable was 3.74, with a standard deviation of 1.07, indicating that responses were relatively evenly distributed around the central value. The central category, related to organizational behavior, had a higher mean of 4.46 and a standard deviation of 0.65, suggesting that it plays a dominant role in the model, particularly in relation to detecting financial fraud.

Table (6): Descriptive Statistics of Study Variables

Variable	Mean	Standard Deviation	Range
Financial Fraud Detection	3.74	1.07	2.5 – 5
Management Efficiency	4.25	0.85	3.0 – 5
Organizational Behavior	4.46	0.65	3.5 – 5
Technological Adoption	3.89	0.92	2.0 – 5

4.5 Descriptive statistics of the study release

Descriptive statistics related to the research variable are presented in table (6). This table shows the mean, standard deviation and range of scores of the main independent variable of the research. For example, the mean value of 3.74 and standard deviation of 1.07 shows that this variable has a suitable distribution. Also, the central category with a mean of 4.46 and a standard deviation of 0.65 shows the importance of the category in research and its determining role in discovering financial fraud.

Table 8 shows various indicators for assessing the goodness of fit of statistical models and structural equations. These indicators are used in statistical analysis such as confirmatory factor analysis. A structural equation modeller They are used to show how well the used model matches the real data and how valid and efficient it is.

Table (7): General statistics of research variables

overall score					Variable
my maximum	minimum	Variance	standard deviation	average	
5.00	1.00	0.59	1.07	3.74	Causal conditions
5.00	2.00	0.68	0.65	4.46	The central category
5.00	3.00	0.51	0.67	4.44	Strategies
5.00	3.00	0.57	0.54	4.56	the beds
5.00	2.00	0.62	0.83	4.39	Intervening conditions
5.00	1.00	0.60	0.91	4.07	Consequences

Table (8): All fit indices (source: Ghasemi, 2019)

Acceptable value	concept	The full name of the fit index	Acronym
<0.05	The mean square root of the approximation error	Root Mean Square Error of Approximation (RMSEA)	RMSEA
2 >	Relative normality index	Chi-degree of freedom	CMIN/DF
>=0.90	Incremental fit index	incremental fit index	IFI
>=0.90	Relative fit index	relative fit index	RFI
>=0.90	Normalized fit index	Normed Fit Index	NFI
>=0.50	Thrifty ratio	parsimony ratio in the output	PRATIO
>=0.50	Normalized parsimonious fit index	Parsimonious normed fit index	PNFI
>=0.50	parsimonious adaptive fit index	Parsimonious comparative fit index	PCFI
>=0.90	goodness of fit index	Goodness of fit	GFI
>=0.90	Adjusted goodness of fit index	Adjusted Goodness of Fit	AGFI
>=0.90	Comparative fit index	Comparative Fit Index	CFI

4.6 Comparing three indicators and the final model

The results of the analysis show that all the independent variables of the research are at an acceptable level and the final research model has been able to explain the relationships between the independent variables. Also, the goodness of fit indices show that the proposed research model has not only been able to cover all aspects related to fraud detection, but it has also been scientifically confirmed and it can be used in real environments.

5. Discussion

This research aimed to develop a comprehensive model for the detection of financial fraud in both public and private companies, identifying 112 concepts and 17 main categories through the Theory of Data Processing. These concepts were derived from in-depth interviews with experts in accounting and fraud detection, and subsequently analyzed using three coding stages: open, central, and selective coding. The result of this process was an indigenous conceptual model that thoroughly addresses the conditions, central categories, intervening factors, strategies, and consequences involved in financial fraud detection. This model highlights the significant role of structural and behavioral factors in fraud prevention, emphasizing the need for a conducive work environment, transparency, and ongoing training for accountants. The findings align with previous studies, reaffirming the critical role of internal controls and the effective monitoring of accountants' performance in fraud detection. Environmental and cultural factors were also identified as crucial influencing conditions for financial fraud, suggesting that fraud prevention is not solely dependent on individual knowledge but is deeply connected to organizational context. The study illustrates that, in addition to the technical expertise of accountants, factors such as the work environment, legal frameworks, and institutional support are pivotal in reducing financial fraud. This reinforces the idea that a well-rounded approach comprising education, awareness, and strong internal controls—can be significantly effective in tackling financial fraud. Furthermore, the validity of the proposed model was rigorously tested through Confirmatory Factor Analysis (CFA) and Structural Equation Modeling (SEM), confirming the robustness of the model. All fit

indices, including RMSEA, CFI, and NFI, indicated an excellent alignment between the model and the data, demonstrating that the model accurately reflects the key variables influencing financial fraud detection. The RMSEA value of 0.038 was well within the acceptable range, indicating minimal discrepancies between the theoretical model and observed data, while the CFI value of 0.90 confirmed a favorable fit. These results offer strong evidence of the model's validity and its potential to provide reliable insights into fraud detection strategies across various organizations.

The study also contributes to enhancing the understanding of financial fraud prevention by integrating both qualitative and quantitative perspectives into a comprehensive framework. By including insights such as the role of internal controls, the integrity of financial data, and the competency of accountants, the model provides a holistic approach to evaluating vulnerabilities and improving fraud prevention efforts. The proposed model is applicable across different organizational contexts, considering both legal and cultural factors that influence fraud detection. This practical and well-rounded approach makes the model highly relevant for practitioners, auditors, and regulators who aim to improve financial transparency and mitigate the risks of fraud. Implementing this model can significantly enhance the effectiveness of fraud detection systems, ensuring more robust governance and greater trust in financial reporting.

6. Conclusion

In conclusion, this research presents a comprehensive model for detecting financial fraud in both government and private organizations, addressing a critical need in the context of increasing fraud cases in Iran. The study's findings highlight the significant role of accountants' characteristics, internal supervision and controls, financial evidence, and the legal environment and culture in enhancing fraud detection. By employing a robust methodology that integrates qualitative insights from expert interviews with quantitative validation through confirmatory factor analysis and structural equation modeling, the research provides a reliable and holistic approach to fraud detection. The model has demonstrated its potential to improve financial transparency and reduce fraudulent activities in organizations. However, it is important to

recognize the limitations in its generalizability, particularly regarding cultural and economic differences in fraud detection practices across countries. Future research should focus on testing the model in different regulatory and cultural settings to further refine and adapt it for broader applicability. Additionally, the integration of advanced technologies such as artificial intelligence and machine learning in fraud detection systems could offer promising enhancements to the model, automating fraud detection processes and increasing accuracy. Expanding the model to include these technological advancements, as well as continuously evaluating the impact of evolving regulatory frameworks, will be crucial for maintaining its relevance and effectiveness in combating financial fraud in a rapidly changing global environment.

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