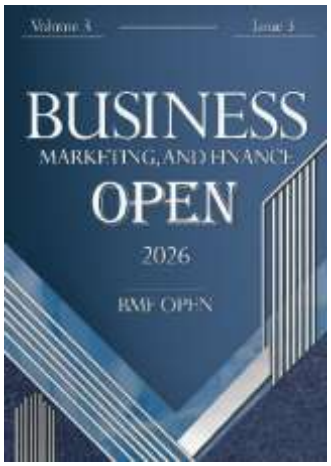
Designing a Model and Ranking the Digital Transformation Components Affecting the Quality of Accounting Information in Iran's Capital Market: A Fuzzy Delphi Approach



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Abstract: The purpose of this study is to identify, rank, and present a model of digital transformation components that influence the quality of accounting information in Iran's capital market. In recent years, the expansion of technologies such as artificial intelligence, cloud computing, and blockchain has transformed financial and accounting processes, emphasizing the need to reexamine the factors that affect the quality of financial information. This research is applied in terms of purpose and employs a mixed (qualitative–quantitative) method. In the qualitative–quantitative phase, the Fuzzy Delphi technique was used to collect expert opinions and to fuzzify/defuzzify judgments for ranking the components. The statistical population consisted of 18 academic and professional experts who reached a consensus after three Delphi rounds. The findings indicate that 12 main components can be classified into three dimensions: technological (such as artificial intelligence, cloud computing, blockchain, and accounting automation), control–security (such as digital internal controls and data governance), and human–institutional (such as digital literacy and technology acceptance culture). The ranking results showed that artificial intelligence, automation, and cloud computing have the highest importance in improving the accuracy, transparency, and reliability of information. Practically, the findings can serve as a foundation for developing a digital transformation roadmap for financial institutions, listed companies, and regulatory bodies, leading to enhanced financial reporting quality and increased investor confidence.

Keywords: digital transformation, quality of accounting information, capital market, Fuzzy Delphi, artificial intelligence, blockchain

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1. Introduction

The accelerating wave of digital transformation has fundamentally reshaped the dynamics of accounting, financial reporting, and decision-making in contemporary organizations. In the era of Industry 4.0, technologies such as artificial intelligence (AI), machine learning (ML), blockchain, cloud computing, and big data analytics have become pivotal in redefining how accounting information is generated, processed, and utilized [1, 2]. The convergence of these technologies enhances transparency, accuracy, and timeliness in accounting information, fostering trust among stakeholders and improving corporate governance [3, 4]. As organizations adapt to the rapidly evolving digital

ecosystem, the role of digital transformation in the accounting profession has transcended beyond mere automation of traditional processes to a comprehensive reconfiguration of organizational structures, systems, and culture [5, 6].

In recent years, the integration of digital technologies into accounting and finance functions has become an essential strategy for sustaining competitiveness in global markets [7, 8]. The process of digital transformation enables firms to align accounting systems with real-time data environments, thus enhancing decision quality and reducing information asymmetry [9]. Studies indicate that AI-based analytics can facilitate predictive modeling, anomaly detection, and fraud prevention, thereby improving the reliability and comparability of accounting information [10, 11]. Similarly, the deployment of blockchain technology strengthens traceability and immutability in financial transactions, promoting auditability and accountability in reporting systems [12, 13]. These technologies collectively enhance the qualitative characteristics of accounting information—namely accuracy, relevance, reliability, and timeliness—which are essential for decision-making in capital markets [3, 9].

From a strategic standpoint, digital transformation represents a multidimensional construct encompassing technological innovation, organizational change, and cultural adaptation [6, 14]. Organizational culture plays a decisive role in facilitating the adoption of digital systems, as cultural flexibility, openness to innovation, and leadership support determine the success of digital accounting transformation [15, 16]. In this context, digital culture has emerged as both a mediator and enabler of transformational leadership and employee performance, ensuring alignment between human resources and technological advancement [5, 16]. The findings of recent research also emphasize that institutional and behavioral factors such as digital literacy, technology acceptance, and managerial commitment are integral to achieving sustained improvement in accounting information quality [14, 17].

The concept of *digital accounting* reflects the integration of advanced digital tools into the entire accounting cycle, from transaction recording to real-time financial reporting and auditing [1, 18]. The emergence of digital accounting has been accompanied by a shift from periodic financial reporting toward continuous accounting, which enables organizations to access up-to-date financial insights and make informed operational and strategic decisions [12]. This transformation requires a redefinition of professional competencies in accounting, emphasizing data analytics, cybersecurity awareness, and technological adaptability [19, 20]. As financial data becomes increasingly digitalized, the assurance of data quality and protection from cyber threats become critical determinants of the credibility of accounting information [2, 6].

Furthermore, digital transformation has been identified as a key driver of accounting information comparability and transparency [7, 8]. Comparative studies reveal that firms implementing digital systems exhibit higher levels of financial transparency and consistency across reporting periods and jurisdictions [4, 9]. Such enhancements contribute to market efficiency, investor confidence, and the mitigation of information asymmetry [3, 8]. However, these improvements are contingent upon the organization's ability to manage the challenges of digital transformation, including integration complexity, data standardization, and employee resistance to change [5, 21]. Therefore, the implementation of digital accounting requires not only technological infrastructure but also a supportive institutional environment and adaptive organizational culture [14, 16].

Empirical evidence supports the argument that digital transformation contributes to the improvement of accounting information quality through enhanced data governance, real-time analytics, and continuous auditing [2, 10]. Digital internal controls, supported by cybersecurity frameworks, ensure the integrity and confidentiality of financial information [3, 6]. Moreover, cloud-based systems facilitate integrated access to financial data across

departments, allowing organizations to respond rapidly to environmental changes and decision needs [4, 12]. The fusion of these technologies fosters a dynamic and data-driven accounting environment in which management can rely on timely, accurate, and reliable information for strategic planning [7, 8].

In the context of Iran's capital market, digital transformation has emerged as a pressing necessity for improving the credibility and timeliness of financial information. Despite notable advances in technology, the quality of accounting information remains challenged by fragmented data systems, limited automation, and insufficient digital literacy among accounting professionals [18, 20]. Consequently, the integration of digital technologies is expected to enhance transparency, reduce reporting errors, and foster accountability across financial institutions. Studies conducted in various emerging markets suggest that digital accounting reforms contribute to administrative health and the reduction of corruption by strengthening control mechanisms and audit trails [18, 22].

Moreover, the success of digital transformation initiatives depends heavily on organizational readiness, leadership vision, and regulatory support [5, 14]. Leadership commitment to digital innovation encourages employee participation and accelerates the internalization of new technologies [6, 16]. Institutional frameworks, including government policies, professional standards, and legal infrastructures, also shape the trajectory of digital transformation in accounting systems [13, 22]. In particular, regulatory bodies play a crucial role in establishing data governance standards, cybersecurity regulations, and digital reporting requirements that ensure uniformity and reliability of financial information [2, 8].

The interplay between technological, structural, and human factors underscores the multidimensional nature of digital transformation. The technological dimension focuses on the adoption of intelligent systems, automation tools, and data integration platforms that enhance operational efficiency [10, 11]. The structural or control dimension emphasizes internal controls, audit continuity, and cybersecurity mechanisms that maintain the integrity of financial data [3, 6]. The human and institutional dimension highlights the significance of digital literacy, adaptive culture, and regulatory compliance as enablers of sustainable digital transformation [5, 14]. Collectively, these dimensions form the conceptual foundation for understanding how digital transformation influences the quality of accounting information [8, 9].

The literature also points to the mediating role of digital culture and organizational learning in strengthening the link between technological adoption and information quality [5, 16]. Organizations that cultivate a digital culture characterized by openness, collaboration, and experimentation are more likely to leverage digital tools effectively and enhance their accounting information systems [6, 14]. Moreover, the synergy between digital transformation and strategic management accounting contributes to innovation, value creation, and competitive advantage in the digital economy [17, 20].

Given these perspectives, the present study seeks to identify, rank, and model the key digital transformation components influencing the quality of accounting information in Iran's capital market.

2. Methodology

The present study is philosophically based on the pragmatism approach, which emphasizes the combined use of quantitative and qualitative methods to solve real-world problems. Since the objective of the research is to identify and rank the components of digital transformation affecting the quality of accounting information in Iran's capital market, the study is exploratory–descriptive in nature and applied–developmental in purpose. This research aims to generate actionable knowledge for decision-making in financial organizations and capital market

regulatory institutions and, rather than testing hypotheses, focuses on discovering and prioritizing key components.

In terms of data type, the research employs mixed (qualitative–quantitative) data. In the qualitative phase, potential digital transformation components were identified through a review of theoretical literature and analysis of expert opinions. Subsequently, in the quantitative phase, the Fuzzy Delphi method was applied, converting experts' linguistic judgments into fuzzy numerical data, and determining the main components and their relative importance based on the degree of consensus. This combination of data and methods aligns with the pragmatic philosophy, as it relies on expert experience and opinion while employing quantitative tools to enhance accuracy and reliability of the results.

The statistical population of this research consists of experts in the fields of accounting, auditing, information technology, and the capital market who possess a deep understanding of digital transformation concepts and accounting information quality. These individuals included university professors, financial managers of listed companies, certified public accountants, and specialists in accounting information systems.

Purposeful sampling was used in this study to select individuals with direct experience and specialized knowledge of the research topic. The criteria for selecting experts included a minimum of ten years of relevant professional or research experience, participation in projects related to financial technologies, and holding at least a master's or doctoral degree in accounting, financial management, or information technology. In total, 18 experts with diverse professional backgrounds and interdisciplinary perspectives participated as the final sample in the multi-stage Fuzzy Delphi process.

The data for this study were collected using a combination of qualitative and quantitative approaches. In the first stage, qualitative data were extracted through a systematic review of theoretical literature, examination of domestic and international research, and analysis of scientific documents related to digital transformation and accounting information quality. Based on this theoretical review, a list of potential digital transformation components was identified and used as the foundation for designing the data collection instrument.

In the second stage, field data were gathered using a Fuzzy Delphi questionnaire. The questionnaire included a set of proposed components, and experts were asked to assess the importance of each using a five-point fuzzy linguistic scale (very low to very high). The linguistic responses of experts were quantified as triangular fuzzy numbers (L, M, U). Data collection was conducted over several iterative rounds of the Fuzzy Delphi process to achieve theoretical consensus among experts. In each round, after analyzing the results, the revised questionnaires were redistributed to the experts to enhance the convergence of opinions.

The data analysis process in this study was conducted in two main stages. In the first stage, to identify and reach consensus on the digital transformation components affecting the quality of accounting information, the Fuzzy Delphi method was applied. Accordingly, the data obtained from expert questionnaires were collected in linguistic values (low, medium, high, etc.) and then converted into triangular fuzzy numbers (L, M, U). Subsequently, the fuzzy mean for each component was calculated, and the final values were extracted using the defuzzification formula. The acceptance threshold for confirming components was determined based on expert consensus, and components with fuzzy means above the criterion level were accepted as final factors.

In the second stage, to determine the relative importance and priority of the identified components, the final fuzzy mean method was applied. In this stage, the defuzzified values obtained from the Delphi rounds were used as the basis for ranking the components to determine the degree of their influence on improving the quality of

accounting information. The ranking of components was performed from the highest to the lowest importance according to the fuzzy mean values.

3. Findings and Results

This section presents the results obtained from the various stages of implementing the Fuzzy Delphi method. As explained in the methodology section, the objective of this phase was to achieve expert consensus in identifying and prioritizing digital transformation components affecting the quality of accounting information. Initially, a set of preliminary components was extracted through literature review and exploratory interviews, and subsequently, experts' opinions were analyzed across multiple Delphi rounds. Using fuzzy logic, the experts' linguistic judgments were converted into quantitative values, and the fuzzy mean for each indicator was calculated to determine both the degree of importance and the level of consensus regarding each component. The following sections present the results of the Fuzzy Delphi stages, including consensus level, final weights, and component ranking.

In this stage, the opinions of 18 experts in the fields of accounting, information technology, and capital markets were analyzed using three rounds of the Fuzzy Delphi method. Initially, 24 components were identified; after conceptual integration and screening, 12 main digital transformation components affecting the quality of accounting information were confirmed. For each component, the fuzzy range of expert opinions was calculated as a triplet (L, M, U), and then defuzzification was performed using the triangular mean formula. Components with a final score equal to or greater than 0.69 were accepted as final factors.

Table 1. Final Digital Transformation Components Affecting the Quality of Accounting Information (Fuzzy Delphi Results)

No.	Final Component	Short Conceptual Definition	Fuzzy Range (L, M, U)	Defuzzified Score
1	Artificial Intelligence and Machine Learning in Data Analysis	Use of intelligent algorithms for prediction, pattern analysis, and fraud detection	(0.72, 0.90, 0.97)	0.86
2	Automation of Accounting Processes	Automating recording, classification, and account closing to reduce human error	(0.68, 0.86, 0.95)	0.83
3	Cloud Computing and Real-Time Reporting	Integration and simultaneous data access to enhance timeliness of information	(0.66, 0.85, 0.94)	0.82
4	Blockchain and Distributed Ledger	Immutable recording of transactions to strengthen transparency and auditability	(0.62, 0.81, 0.92)	0.78
5	Digital Internal Controls and Continuous Auditing	Designing automated controls and real-time monitoring of transactions	(0.61, 0.80, 0.91)	0.77
6	Cybersecurity and Data Protection	Use of encryption, authentication, and intrusion detection systems	(0.60, 0.79, 0.90)	0.76
7	Visual Analytics and Data Visualization	Use of dynamic dashboards and interactive models to improve data understanding	(0.58, 0.78, 0.89)	0.75
8	User-Friendly Financial Reporting Platforms	Visual interfaces, customized reporting, and ease of use for users	(0.56, 0.76, 0.88)	0.73
9	Digital Literacy and Employee Readiness	Employee skills in utilizing modern financial technologies and AI tools	(0.54, 0.74, 0.87)	0.72
10	Data Governance and Information Standardization	Existence of policies and formal structures for data source control and quality	(0.53, 0.73, 0.86)	0.71
11	Technology Acceptance and Digital Organizational Culture	Attitudes, support, and willingness of managers and employees toward technological changes	(0.52, 0.72, 0.85)	0.70
12	Institutional Support and Digital Legal Requirements	Regulations, standards, and institutional pressures for digital transparency	(0.52, 0.71, 0.84)	0.69

The Fuzzy Delphi results revealed that technological components such as artificial intelligence, automation, and cloud computing achieved the highest consensus and importance among experts. These components directly influence two key attributes of accounting information quality—accuracy and timeliness. Conversely, institutional and cultural components, including digital literacy, technology acceptance, and data governance, although scoring lower numerically, are essential for sustaining the long-term effects of technology and internalizing information quality. In other words, digital transformation is not limited to the implementation of technological tools but requires institutional infrastructure, legal compliance, and an organizational culture that supports the accuracy and integrity of data within the accounting cycle.

From a theoretical perspective, the findings align with the Technology Acceptance Model (TAM), the Diffusion of Innovations (DOI) theory, and Institutional Theory. These three frameworks explain that technology adoption is not only a function of perceived usefulness but is also influenced by professional, regulatory, and cultural pressures. Overall, expert consensus indicates that improving the quality of accounting information in Iran's capital market depends on the coordinated interaction among three categories of components:

Technological (AI, cloud computing, blockchain)

Control and Security (digital controls, data governance)

Human and Institutional (digital literacy, technology acceptance culture)

These results form the foundation for developing the final model and ranking the components in the next section of the study.

After identifying the main digital transformation components using the Fuzzy Delphi method, the final fuzzy mean approach was applied to determine the relative importance and priority of each component affecting accounting information quality. In this method, the defuzzified values obtained in the previous phase served as the basis for ranking.

The fuzzy mean for each component was calculated based on the aggregation of expert judgments and represents the degree of importance of each component in improving the quality of accounting information in Iran's capital market. Components with higher fuzzy mean values are considered by experts to have a greater impact on enhancing accuracy, reliability, and timeliness of financial information. The final ranking results are presented in the table below.

Table 2. Ranking of Digital Transformation Components Affecting the Quality of Accounting Information

Rank	Digital Transformation Component	Final Defuzzified Value	Relative Importance	Interpretation
1	Artificial Intelligence and Machine Learning in Data Analysis	0.86	Very High	Enhances data accuracy, detects fraud, and enables predictive financial analysis
2	Automation of Accounting Processes	0.83	High	Reduces human error and accelerates financial operations
3	Cloud Computing and Real-Time Reporting	0.82	High	Improves simultaneous access and timeliness of accounting data
4	Blockchain and Distributed Ledger	0.78	High	Ensures transaction integrity and enhances reporting transparency
5	Digital Internal Controls and Continuous Auditing	0.77	Relatively High	Improves data reliability and enables real-time monitoring
6	Cybersecurity and Data Protection	0.76	Relatively High	Prevents information disclosure and strengthens financial data confidentiality
7	Visual Analytics and Data Visualization	0.75	Moderate to High	Improves decision-makers' understanding of complex financial data

8	User-Friendly Financial Reporting Platforms	0.73	Moderate	Facilitates access to and comprehension of financial reports by diverse users
9	Digital Literacy and Employee Readiness	0.72	Moderate	Enhances digital skills and technology adoption in financial units
10	Data Governance and Information Standardization	0.71	Moderate	Increases consistency and accuracy of financial reporting data
11	Technology Acceptance and Digital Organizational Culture	0.70	Relatively Low	Highlights managerial attitudes and cultural resistance in digital transformation success
12	Institutional Support and Digital Legal Requirements	0.69	Low	Reflects the role of policies, regulations, and institutional pressures in digital institutionalization

The above table indicates that, from the experts' perspective, artificial intelligence and machine learning hold the highest importance in enhancing the quality of accounting information. This component directly contributes to improving data accuracy, detecting financial anomalies, and increasing the reliability of information.

Following this, automation of accounting processes and cloud computing occupy the second and third ranks, respectively—both confirmed by experts as means to reduce errors, accelerate operations, and improve access to financial data. These two components demonstrate that digital transformation represents not merely technological tools but a fundamental process-oriented change within the financial reporting system.

In the mid-range rankings, components such as digital internal controls and cybersecurity were placed, reflecting their protective and control-oriented nature, which contributes to the long-term stability of information quality.

In contrast, components like institutional support and digital legal requirements, although vital from a policymaking perspective, were perceived by experts to have less direct impact on accounting information quality and to function more as facilitators within the transformation process.

Overall, it can be concluded that the combination of intelligent technologies (AI and automation) with robust data control and security infrastructures exerts the greatest influence on improving the qualitative attributes of accounting information—namely, accuracy, reliability, and timeliness.

Based on the results obtained from the two stages of the Fuzzy Delphi method and fuzzy mean ranking, the final model of the research was designed to clearly illustrate the relationship between the dimensions of digital transformation and the quality of accounting information in the form of a conceptual framework.

Data analysis revealed that the factors affecting the quality of accounting information can be categorized into three main dimensions:

Technological dimension,

Control and security dimension,

Institutional and human dimension.

Each of these dimensions includes a set of key components whose interactions form the integrated structure of the digital transformation model. This model is grounded in the Technology Acceptance Model (TAM), the Diffusion of Innovations (DOI) theory, and Institutional Theory, aiming to demonstrate that the quality of accounting information is the result of the simultaneous integration of technological, structural, and behavioral factors.

Table 3. Dimensions and Components of the Final Digital Transformation Model Affecting the Quality of Accounting Information

Main Dimension	Components	Role in Improving the Quality of Accounting Information
Technological	1. Artificial intelligence and machine learning 2. Automation of accounting processes 3. Cloud computing and real-time reporting 4. Blockchain technology	Enhancing data accuracy and validity, reducing human error, ensuring transaction transparency, and providing real-time access to financial information
Control and Security	5. Digital internal controls 6. Cybersecurity and data protection 7. Visual analytics and data visualization 8. Data governance and standardization	Increasing reliability and user confidence, enabling continuous monitoring, maintaining data confidentiality, and strengthening decision-makers' understanding
Institutional and Human	9. User-friendly reporting platforms 10. Digital literacy and employee readiness 11. Technology acceptance culture and digital leadership 12. Institutional support and legal requirements	Promoting technology adoption within organizations, enhancing human resource capabilities, ensuring regulatory compliance, and supporting transparent financial reporting through policy frameworks

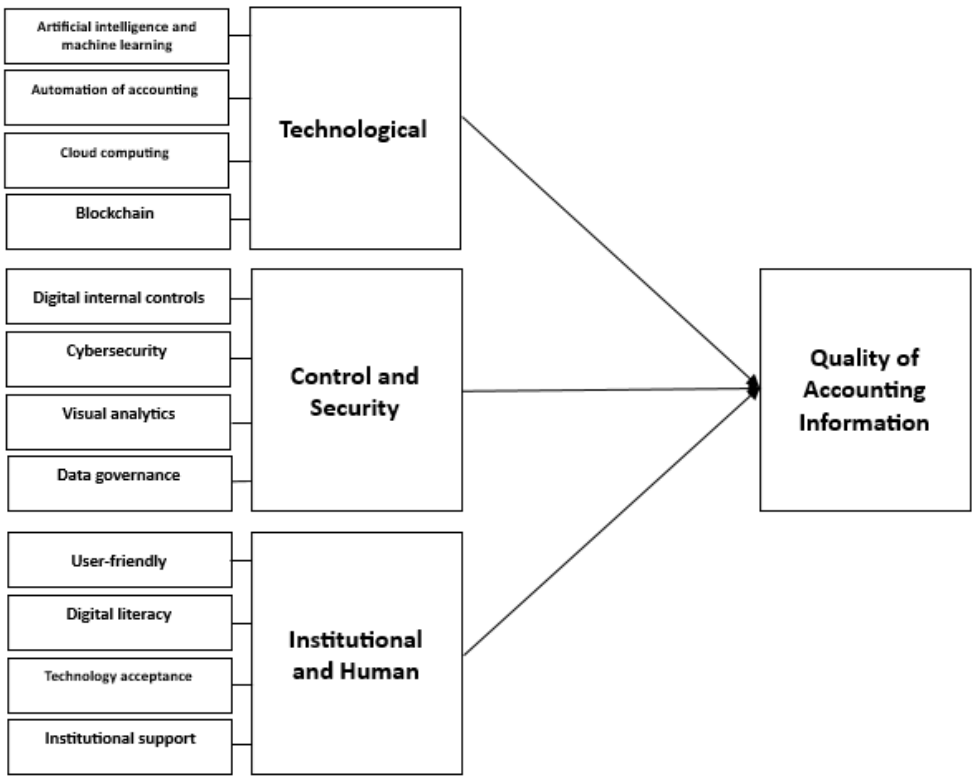

Figure 1. Dimensions and Components of the Final Digital Transformation Model Affecting the Quality of Accounting Information

As indicated in the table and figure above, the final research model demonstrates that digital transformation is a multifaceted construct in which technological, control, and institutional dimensions simultaneously influence the quality of accounting information.

In the technological dimension, modern technologies such as artificial intelligence, blockchain, and cloud computing directly enhance the qualitative characteristics of accounting information, including accuracy, reliability, and timeliness. This dimension provides the technical infrastructure necessary for producing precise and up-to-date data.

In the control and security dimension, the focus is on the integrity and soundness of information flows. The presence of digital internal controls, cybersecurity policies, and a robust data governance framework increases stakeholders' trust and confidence in financial reports.

In the institutional and human dimension, digital organizational culture and employee skills play a vital role. Even the most advanced technologies will not succeed without adequate human readiness and legal support. Therefore, digital literacy, a positive attitude toward technology, and policy-level support for digital financial reporting are key prerequisites for the sustainable success of digital transformation in the capital market.

4. Discussion and Conclusion

The findings of this study confirmed that digital transformation has a significant and multidimensional influence on the quality of accounting information in Iran's capital market. Using the Fuzzy Delphi approach, three major dimensions were identified—technological, control and security, and institutional and human—each consisting of key components that collectively determine the reliability, accuracy, and timeliness of accounting data. Among these, technological components such as artificial intelligence (AI), automation, and cloud computing obtained the highest importance scores, demonstrating that modern digital technologies play a central role in enhancing accounting information quality. These findings are consistent with the global trend in which intelligent technologies are reshaping the financial reporting landscape by enabling real-time analytics, predictive insights, and fraud detection [10, 11]. The prioritization of technological factors suggests that accounting functions are increasingly reliant on digital ecosystems to produce transparent, reliable, and data-driven financial information [3, 8].

The prominence of AI and machine learning (ML) as top-ranked factors aligns with studies emphasizing their transformative potential in accounting analytics and auditing. AI-based models facilitate error reduction, enhance accuracy in financial forecasting, and allow for the early detection of anomalies in accounting data [10, 11]. As shown in recent research, organizations adopting AI-driven tools experience increased efficiency in their accounting information systems (AIS) and improved comparability of financial data across reporting periods [7, 8]. Moreover, the study's finding that automation ranks second in importance supports the assertion that robotic process automation (RPA) reduces manual intervention, accelerates data processing, and enhances operational precision [1, 2]. The automation of routine accounting tasks enables accountants to focus on analytical and strategic functions, improving the overall quality and relevance of accounting information [14, 20].

Cloud computing, which was identified as the third most influential component, plays a crucial role in facilitating real-time data integration and accessibility. This finding supports the arguments of previous studies that cloud-based accounting systems enhance the timeliness, accuracy, and transparency of financial reporting [4, 12]. The ability to process and share financial data instantaneously across organizational units fosters improved coordination and informed decision-making [3, 6]. Additionally, blockchain technology—ranked fourth in this study—was confirmed as a vital factor that improves the traceability and auditability of accounting records by

providing immutable transaction histories. This result corresponds with research indicating that blockchain's distributed ledger systems reduce fraud, strengthen audit trails, and build stakeholder trust in accounting information [12, 13].

The second dimension—control and security—comprising digital internal controls, cybersecurity, data governance, and continuous auditing, was found to be equally critical for maintaining the integrity and confidentiality of accounting information. The results revealed that robust digital internal controls enhance reliability by providing real-time monitoring and early detection of irregularities [2, 6]. Cybersecurity, identified as another high-priority factor, safeguards financial systems from unauthorized access and data breaches, ensuring compliance with information protection standards [3, 4]. The study's emphasis on data governance and standardization aligns with the findings of [9], who demonstrated that clear data policies and uniform reporting standards are essential for maintaining transparency and comparability across financial statements. The integration of control and security mechanisms ensures that digital transformation not only enhances efficiency but also upholds the fundamental principles of data integrity and accountability [8, 22].

The human and institutional dimension, although scoring relatively lower than the technological one, emerged as a foundational pillar supporting sustainable digital transformation. Components such as digital literacy, organizational culture, and institutional support were found to be essential enablers of technological adoption and internalization. The study's results confirm that digital transformation cannot succeed solely through the deployment of technology; it requires a supportive organizational culture and skilled human resources [6, 14]. This is consistent with the argument that organizations with strong digital leadership and culture are better positioned to implement transformative technologies effectively [5, 16]. Moreover, digital literacy among accounting professionals enhances adaptability to new systems, reduces resistance to change, and increases the quality of outputs in accounting information systems [15, 20].

Institutional support and digital regulatory frameworks, while ranked lowest in this study, were recognized as significant contextual factors. This finding reflects the broader understanding that government policies, accounting standards, and legal infrastructures influence the trajectory of digital transformation [13, 22]. Institutional alignment ensures that organizations comply with digital reporting and cybersecurity requirements, thereby fostering trust in financial markets [2, 9]. Although experts rated institutional support as less directly influential compared to technological elements, it serves as a catalyst for ensuring long-term stability, legal conformity, and ethical use of digital systems in accounting practices [5, 8].

Overall, the triadic structure of the model—technological, control and security, and institutional-human—demonstrates a holistic relationship between digital transformation and accounting information quality. The interplay of these dimensions indicates that digital transformation is not a linear process but rather an integrative and adaptive system where technology, governance, and human capability interact dynamically [6, 7]. The results correspond with previous theoretical frameworks such as the Technology Acceptance Model (TAM) and the Diffusion of Innovations (DOI), which emphasize perceived usefulness, social influence, and institutional pressures as critical determinants of technology adoption in accounting and finance [5, 8].

Comparing these results with international studies underscores their relevance. For instance, [3] found that corporate digital transformation directly enhances the quality of accounting information through improved data reliability and reduced asymmetry, similar to the positive association revealed in this study. Similarly, [4] showed that digital transparency in financial markets sustains profitability and strengthens stakeholder trust, validating the study's findings that cloud computing and real-time reporting promote market confidence. Furthermore,

research by [12] and [1] supports the identified importance of automation and continuous accounting in enabling efficient and timely financial reporting.

The importance of digital internal controls and cybersecurity also resonates with findings from [2], who demonstrated that firms adopting digital auditing systems experience improved data assurance and reduced reporting errors. Similarly, [6] highlighted that digital transformation reshapes organizational structures by embedding multi-level control systems that enhance transparency. The present findings further confirm that such controls are indispensable to maintaining data consistency, particularly in developing markets like Iran's, where financial systems are still transitioning toward digital maturity.

In addition, the study's results on the role of digital culture and literacy are consistent with the insights of [5] and [16], who emphasized that cultural transformation is a critical enabler of successful technological adoption. Organizational readiness, leadership commitment, and employee adaptability constitute the foundation for implementing digital systems effectively [14, 15]. Moreover, the integration of digital skills into accounting education and professional training enhances the overall competence of the workforce and supports sustainable transformation [17, 20].

The interrelation between technology, governance, and human capital reinforces the emerging view that digital transformation in accounting should be treated as a socio-technical phenomenon rather than merely a technological innovation [6, 21]. As such, organizations that combine technological innovation with institutional alignment and human resource development achieve higher performance in data management and financial reporting [8, 9]. In the Iranian context, this comprehensive approach is particularly crucial due to the evolving nature of capital market regulations and the increasing demand for transparency and accountability in financial reporting [18, 20].

Finally, the ranking results of this study provide an evidence-based foundation for prioritizing digital initiatives in financial organizations. The high ranking of AI, automation, and cloud computing implies that investments in intelligent technologies yield the most substantial impact on accounting information quality. Conversely, institutional and cultural factors, though secondary in rank, represent the backbone of sustainability in digital transformation efforts [5, 13]. This suggests that digital transformation strategies should balance technological investments with initiatives aimed at strengthening digital literacy, governance, and regulatory frameworks [14, 16]. The integration of these elements ensures not only efficiency but also ethical accountability and long-term trust in financial information systems [8, 9].

This study, while offering a comprehensive framework for understanding the components of digital transformation influencing accounting information quality, is subject to several limitations. First, the research sample consisted of a relatively small group of 18 experts, which may restrict the generalizability of the results. The reliance on expert judgment within the Fuzzy Delphi method, although effective for consensus building, may introduce subjective bias in the evaluation and ranking of components. Second, the study focused exclusively on Iran's capital market, which may differ significantly from other national contexts in terms of technological infrastructure, regulatory systems, and institutional maturity. Third, while the study identified and ranked critical components, it did not empirically test the quantitative causal relationships among these variables, which limits the ability to infer direct cause-and-effect linkages. Additionally, rapid technological evolution may render some of the findings time-sensitive, requiring periodic reevaluation to maintain relevance.

Future studies could extend this research by employing larger and more diverse samples that include international experts to enhance the generalizability of results across different economic and regulatory contexts. Quantitative modeling techniques such as Structural Equation Modeling (SEM) or Partial Least Squares (PLS) could

be used to empirically validate the relationships among digital transformation dimensions and accounting information quality. Researchers may also explore sectoral differences, investigating how digital transformation impacts accounting information in industries such as banking, manufacturing, or public administration. Furthermore, future research could examine the moderating roles of organizational culture, leadership style, and digital infrastructure readiness in shaping the success of digital transformation initiatives. Longitudinal studies would also be valuable in assessing how the effects of technological adoption evolve over time and contribute to sustained improvements in information quality.

Organizations aiming to enhance the quality of accounting information through digital transformation should prioritize investments in AI, automation, and cloud-based systems, which yield the most immediate and measurable benefits. Management should also strengthen internal control and cybersecurity frameworks to protect data integrity and maintain stakeholder trust. Capacity-building initiatives such as digital literacy training, continuous professional development, and change management programs should be implemented to prepare employees for technological transitions. Furthermore, organizations should cultivate a digital-friendly culture that values innovation, adaptability, and collaboration. Policymakers and regulators, on the other hand, should develop supportive legal frameworks and standardized data governance policies to facilitate transparent and consistent financial reporting across industries. By integrating technological innovation with institutional reform and human capacity development, organizations can ensure that digital transformation translates into sustainable improvements in accounting information quality.

Authors' Contributions

Authors equally contributed to this article.

Ethical Considerations

All procedures performed in this study were under the ethical standards.

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Conflict of Interest

The authors report no conflict of interest.

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