Presenting a Model of Digital Transformation Affecting the Quality of Accounting Information in Iran's Capital Market

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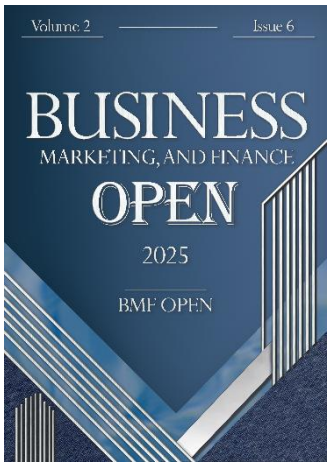

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Abstract: This study investigates and proposes a model of digital transformation that affects the quality of accounting information in Iran's capital market. In terms of purpose, this research is categorized as exploratory. From the research philosophy perspective, the study adopts a holistic approach that encompasses both positivism and interpretivism. Moreover, the research follows a mixed-methods strategy, integrating both quantitative and qualitative methodologies. Initially, to collect data and propose a preliminary model, library research and a systematic literature review were conducted. Subsequently, using the fuzzy Delphi method—including a semi-structured questionnaire distributed among 18 experts in the fields of accounting and digital transformation—the key components of the study were identified. Then, to validate the developed model, a researcher-made questionnaire was designed based on the dimensions confirmed in the second phase for quantitative validation. A statistical sample of 384 individuals, including accountants, professionals involved in accounting activities, corporate managers, accounting and finance faculty members, and IT personnel, was selected, and the questionnaire was distributed among them to collect quantitative data. The data were analyzed using quantitative methods and the Smart PLS software, and the final research model was developed. The results revealed that the following are the key components influencing the quality of accounting information: integration of artificial intelligence to reduce errors (5 subcomponents), blockchain for data validation (4 subcomponents), strong internal controls (5 subcomponents), enhanced security of financial data (4 subcomponents), real-time financial reporting (5 subcomponents), cloud-based systems for timeliness (5 subcomponents), artificial intelligence for process acceleration (5 subcomponents), impact of digital platforms on timeliness (3 subcomponents), data visualization tools (5 subcomponents), user-friendly financial reporting platforms (5 subcomponents), and stakeholder-focused data usability (5 subcomponents). The findings align with established theoretical frameworks, including the Technology Acceptance Model, Diffusion of Innovations, and Institutional Theory, highlighting the importance of understanding the opportunities and challenges organizations face amid the complexities of digital transformation.

Keywords: Accounting Information Quality, Digital Transformation, Artificial Intelligence, Capital Market.

1. Introduction

Digital transformation involves the integration of digital technologies into all aspects of an organization, reshaping how it operates and delivers value to customers, stakeholders, and employees [1]. Digital transformation is not merely about using new tools; rather, it is fundamentally a framework that facilitates the restructuring of

business processes, strategies, and operations to leverage the potential of emerging technologies. This transformation goes beyond the adoption of individual technologies and represents a holistic shift that influences organizational culture, structures, and even social norms [2, 3].

Several theories and scientific frameworks assist in understanding the structure and implementation of digital transformation. For instance, the Technology Acceptance Model (TAM) explores how users accept and utilize new technologies, emphasizing perceived usefulness and ease of use [4]. The Diffusion of Innovations theory highlights the spread and adoption of innovations within social systems, considering factors such as communication channels, time, and the social system itself [5]. Additionally, the Digital Maturity Model assesses an organization's digital readiness across various dimensions such as strategy, capabilities, culture, and technological integration [6].

Accounting information refers to structured data and reports summarizing a company's financial transactions, performance, and position. This concept encompasses various financial statements, including the balance sheet, income statement, cash flow statement, and comprehensive income statement. The purpose of preparing financial statements is to transparently present the company's financial and economic status in order to evaluate cash flows and investment potential, thereby enabling better decisions regarding financial strategies. Accounting information is critical because it serves as the basis for decision-making by internal and external stakeholders, including investors, managers, regulators, and shareholders. It helps stakeholders assess a company's profitability, liquidity, costs, and overall performance, enabling informed decision-making and strategic planning [7].

It is evident that accounting information can only provide such benefits if it possesses acceptable quality. The quality of accounting information is crucial for its reliability, relevance, comparability, and understandability. Reliability ensures that the information is accurate, verifiable, and free from bias or error, thereby increasing stakeholder trust. Relevance ensures the information is pertinent and useful for decision-making. Comparability guarantees that the information is consistent over time and among similar organizations, facilitating meaningful comparisons. Understandability ensures that the information is clearly presented and comprehensible to users with varying levels of financial knowledge [8]. The quality of accounting information directly impacts stakeholders' trust and confidence in financial reports. High-quality accounting information enhances transparency, reduces risks, supports better decision-making, and strengthens the confidence of investors, shareholders, and other stakeholders, ultimately contributing to an organization's long-term success and sustainability [9, 10].

Digital transformation has influenced the quality of accounting information by revolutionizing how financial data is collected, processed, analyzed, and reported [11]. The integration of digital technologies has introduced multiple changes that directly affect the qualitative characteristics of accounting information, such as accuracy, timeliness, relevance, and reliability [12].

The literature on digital transformation and accounting information quality highlights the multifaceted nature of technological impacts on financial reporting. Amirazad et al. (2018) developed a comprehensive model using grounded theory to identify causal, structural, and contextual factors influencing financial reporting quality in Iran, emphasizing political costs, market pressure, and reward incentives [13]. Mohammadi (2020) explored the effect of IT tools—specifically blockchain, IoT, cloud accounting, and big data—finding only cloud accounting had a significant positive impact [14]. Baradaran Sadr and Seyed Sadeghi (2021) empirically confirmed a significant relationship between digital transformation and accounting information quality in firms listed on the Tehran Stock Exchange [15]. Zarei (2022) focused on the public sector, highlighting the role of digital accounting, especially XBRL, in enhancing financial information accessibility and reliability. Ziaei Bideh (2023) examined the role of IT in accounting and auditing systems of SMEs, showing that technological advances improve accuracy, reduce costs,

and expand accounting functionalities [16]. Fornalapatrachakorn and Kalasinthu (2021) found that digital accounting positively influences financial reporting quality and strategic decision-making, moderated by digital transformation. Chen et al. (2022) reported that corporate digital transformation improves accounting information quality by reducing agency problems, especially in firms with low media coverage or cyber risks. Al Shanti and Elessa (2023) emphasized blockchain's potential to enhance reporting quality and corporate governance, urging broader adoption of digital tools in business operations [11]. Wang (2023) showed that digital transformation boosts accounting transparency, especially in private firms and dynamic business environments, thus improving growth outlook and easing financial constraints [17]. Mikhlif and Smaoui (2024) identified that digitalization enhances neutrality and customer service through its impact on accounting information systems [18]. Lastly, Zhang et al. (2024) found that digital transformation significantly improves the comparability of accounting information by mitigating earnings management and agency problems, with stronger effects in competitive or transparent markets [19].

Theories aimed at understanding how digital transformation affects the quality of accounting information often revolve around Information Systems (IS) and Accounting Information Systems (AIS). IS theories, such as the Technology Acceptance Model (TAM) and the Diffusion of Innovations theory, explain how users adopt and integrate new technologies into accounting processes. These theories help elucidate the adoption, use, and impact of digital tools on accounting practices, thereby influencing the quality of accounting information. AIS theories often focus on the role of technology in processing, storing, and disseminating accounting information. For example, the socio-technical systems theory considers both the technical and social aspects of implementing accounting information systems, emphasizing how the interaction between technology and people affects the quality of accounting information [20].

Based on the aforementioned points, this study seeks to investigate and propose a model of digital transformation that affects the quality of accounting information in Iran's capital market. Therefore, the central research question is: What are the components of digital transformation that influence the quality of accounting information in Iran's capital market?

2. Methodology

This study is classified as exploratory in terms of its purpose and focuses on the direct applicability and relevance of the research findings to real-world practices, particularly in accounting methods. The primary objective is to provide practical solutions and insights aimed at enhancing the quality of accounting information through the lens of digital transformation. From a philosophical standpoint, this study adopts a holistic approach that encompasses both positivism and interpretivism. Additionally, the research employs a mixed-methods approach, combining both quantitative and qualitative methodologies. This integrated framework enables a comprehensive and multifaceted understanding of the complex relationship between digital transformation and the quality of accounting information in Iran's capital market.

The qualitative sample population of this study consists of experts and specialists in the fields of accounting and digital transformation, selected due to their experience and subject matter expertise. These individuals include university professors in accounting and information technology, senior corporate executives, and leading experts in digital transformation. In the qualitative phase, purposive sampling was employed. Accordingly, from among professionals in accounting and digital transformation, 18 experts were selected to participate in the second phase of the study.

The quantitative sample population includes all accountants, financial managers, accounting and finance professors, and information technology (IT) experts in companies active in Iran's capital market. This population was selected due to its direct connection to the study's subject matter—digital transformation and accounting information quality. In the quantitative phase, stratified random sampling was used. First, the population was divided into distinct groups, including accountants, financial managers, accounting and finance professors, and IT specialists. Then, a specified number of participants were randomly selected from each group. The sample size was determined to be 384 using Cochran's formula, and this sample was used for data collection.

Phase 1: Systematic Review (Library Method)

This phase involved a systematic search and review of scientific articles, books, theses, and other academic publications related to digital transformation and the quality of accounting information in Iran's capital market. Data were collected from academic databases such as PubMed, Scopus, and Web of Science.

Phase 2: Fuzzy Delphi Method

In this phase, based on the dimensions identified in Phase 1, a questionnaire was developed and distributed to experts and specialists in the relevant field. The fuzzy Delphi method involved using a semi-structured questionnaire administered to 18 experts in accounting and digital transformation. The questionnaire, developed from the dimensions identified in Phase 1, was used to validate expert opinions.

Phase 3: Quantitative Validation

In this phase, a researcher-made questionnaire was designed based on the dimensions confirmed in Phase 2 for quantitative validation. A statistical sample of 384 individuals—including accountants and professionals engaged in accounting activities, company managers, accounting and finance professors, and IT department members—was selected, and the questionnaire was distributed among them to collect quantitative data. The data were then analyzed using quantitative methods, and the final research model was presented.

In Phase 1, a systematic review was conducted using MaxQDA software to analyze and code the data collected from scientific articles, books, theses, and academic publications related to digital transformation and accounting information quality. This phase involved a meticulous examination of academic sources retrieved from databases such as PubMed, Scopus, and Web of Science. MaxQDA software was employed to organize and conduct thematic analysis of the qualitative data. This software enabled the extraction of key themes and dimensions for formulating the initial model.

The subsequent phase, using the fuzzy Delphi method, involved the use of Excel software to compile and structure the responses obtained from 18 experts in accounting and digital transformation. Based on the dimensions identified in the initial systematic review, a semi-structured questionnaire was provided to the experts for validation. The model dimensions were revised according to expert feedback, and the revised framework proceeded to the third phase.

In Phase 3 (quantitative phase), Smart PLS software was used to analyze the collected data for the final validation of the research model. A sample of 384 accountants, company managers, accounting and finance professors, and IT staff members was used in this phase. The purpose of this stage was to validate and refine the research model based on the dimensions confirmed through the fuzzy Delphi method.

3. Findings and Results

To conduct a systematic review and data analysis on digital transformation and the quality of accounting information, the relevant literature was examined with a focus on key topics and dimensions from academic

sources. This process involved reviewing digital transformation within accounting processes and analyzing the technological, organizational, and strategic elements that are critical for evaluating the quality of accounting information. A detailed analysis was then conducted, and the key themes and dimensions were summarized for formulating the preliminary research model.

The identified components and their corresponding dimensions are presented below as the foundational structure for developing the preliminary model:

Table 1. Components and Key Dimensions for the Preliminary Model

Component	Key Dimensions	Source
Accuracy and Reliability of Financial Data	- Enhanced accuracy through AI-based error detection - Use of blockchain for real-time data validation and reliability - Minimization of human error	[21, 22]
Timeliness of Accounting Information	- Real-time access to data via cloud platforms - Shortened reporting cycles through automated systems - Faster data integration and analysis	[21, 23]
Relevance and Usability of Accounting Information	- Enhanced decision-making via predictive analytics tools - Customizable reporting systems based on stakeholder needs - Increased integration of big data for strategic use	[22, 24]

These components and key dimensions provide a solid foundation for formulating the preliminary model of how digital transformation impacts the quality of accounting information in Iran's capital market. The next step will be validating these dimensions using the fuzzy Delphi method. In the subsequent phase, with expert input, more detailed and context-specific components and dimensions will be identified, tailored to the conditions of Iran's capital market.

Initially, a semi-structured questionnaire was utilized. In the second stage of the Delphi method, the components and subcomponents were presented to the experts for re-evaluation. In the final stage, after achieving consensus, the components and subcomponents were provided to the experts using a five-point Likert scale (1 to 5). In this scale, option 1 indicated *very low*, option 2 *low*, option 3 *moderate*, option 4 *high*, and option 5 *very high* for the purpose of converting linguistic variables into fuzzy numbers. Items with a non-fuzzy mean score greater than 0.7 were accepted. The final results of the fuzzy Delphi section are presented in the following table (Table 3).

Table 2. Fuzzy Delphi Results

Variable	Component	Subcomponent	Fuzzy Mean (Expert Opinions)	Defuzzified Value
Accuracy and Reliability of Financial Data	AI Integration for Error Reduction	AI-Based Error Detection	(0.58, 0.83, 0.97)	0.80
		Continuous Auditing Systems	(0.51, 0.76, 0.93)	0.74
		Real-Time Configurations	(0.57, 0.82, 0.94)	0.78
		AI-Based Problem Solving	(0.47, 0.72, 0.92)	0.70
		Predictive and Automated Error Resolution	(0.51, 0.76, 0.92)	0.73
	Blockchain for Data Validation	Blockchain in Audit Trails	(0.60, 0.85, 0.96)	0.80
		Distributed Ledger Technologies	(0.50, 0.75, 0.92)	0.72
		Immutable Record Keeping	(0.51, 0.76, 0.93)	0.74
		Consensus Mechanisms for Verification	(0.40, 0.64, 0.85)	0.63
	Strong Internal Controls	Digital Control Systems	(0.53, 0.78, 0.94)	0.75
		Continuous Monitoring	(0.44, 0.69, 0.86)	0.67

		Automated Compliance Checks	(0.54, 0.79, 0.92)	0.75
		AI-Based Control Systems	(0.44, 0.69, 0.88)	0.67
		Real-Time Regulatory Compliance Reporting	(0.56, 0.81, 0.97)	0.78
	Enhancing Financial Data Security	Cybersecurity Frameworks	(0.42, 0.67, 0.88)	0.65
		Encrypted Data Storage	(0.51, 0.76, 0.92)	0.73
		Two-Factor Authentication Systems	(0.44, 0.69, 0.88)	0.67
		Data Encryption Standards	(0.47, 0.72, 0.93)	0.71
Timeliness of Accounting Information	Real-Time Financial Reporting	Instant Financial Reports	(0.69, 0.94, 0.99)	0.88
		Automated Reporting Tools	(0.44, 0.69, 0.88)	0.67
		Continuous Data Updates	(0.63, 0.88, 0.99)	0.83
		Real-Time Tax Reporting	(0.51, 0.76, 0.94)	0.74
		Real-Time Forecast Configuration	(0.50, 0.75, 0.90)	0.72
	Cloud-Based Systems for Timeliness	Remote Access to Financial Data	(0.53, 0.78, 0.92)	0.74
		Rapid Decision-Making Tools	(0.46, 0.71, 0.88)	0.68
		Cloud Synchronization	(0.51, 0.76, 0.94)	0.74
		On-Demand Financial Statements	(0.54, 0.79, 0.94)	0.76
		Integrated Cloud-Based Accounting Solutions	(0.57, 0.82, 0.94)	0.78
	AI for Process Acceleration	AI-Assisted Reporting	(0.51, 0.76, 0.93)	0.74
		Increased Data Entry Speed	(0.67, 0.92, 1.00)	0.86
		Reduced Manual Workflow	(0.49, 0.74, 0.92)	0.71
		AI-Based Financial Analysis	(0.69, 0.94, 1.00)	0.88
		AI-Supported Forecasting	(0.49, 0.74, 0.92)	0.71
	Impact of Digital Platforms on Timeliness	Faster Financial Approval Workflows	(0.54, 0.79, 0.94)	0.76
		Online Monitoring of Financial Transactions	(0.50, 0.75, 0.92)	0.72
		Real-Time Adjustment of Financial Reports	(0.50, 0.75, 0.90)	0.72
Relevance and Usability of Accounting Information	Data Visualization Tools	Dashboard Reporting	(0.57, 0.82, 0.94)	0.78
		Interactive Data Models	(0.50, 0.75, 0.92)	0.72
		Visual Analytics for Stakeholders	(0.53, 0.78, 0.93)	0.75
		Customizable Reporting Displays	(0.50, 0.74, 0.89)	0.71
		Financial Storytelling through Visualization	(0.42, 0.67, 0.89)	0.66
	User-Friendly Financial Reporting Platforms	Intuitive User Interfaces	(0.57, 0.82, 0.93)	0.77
		Customizable Reporting	(0.50, 0.75, 0.92)	0.72
		Multi-Device Accessibility	(0.40, 0.65, 0.86)	0.64
		User Training for Platform Adoption	(0.50, 0.75, 0.92)	0.72
		Mobile-Compatible Reporting Platforms	(0.46, 0.71, 0.90)	0.69
	Stakeholder-Centered Data Usability	Customized Stakeholder Reports	(0.46, 0.71, 0.90)	0.69

	Personalized Data Displays	(0.46, 0.71, 0.90)	0.69
	Text-Based Information Delivery	(0.49, 0.74, 0.90)	0.71
	Interactive Report Filtering	(0.49, 0.74, 0.89)	0.70
	Stakeholder Collaboration Tools	(0.42, 0.67, 0.85)	0.64

This table summarizes the results of the fuzzy Delphi analysis, with each subcomponent evaluated based on expert opinions using a fuzzy scale and subsequently defuzzified to assess the strength of consensus. Subcomponents with defuzzified values greater than 0.70 were considered valid for inclusion in the final model.

Based on the results obtained from the fuzzy Delphi method concerning digital transformation and the quality of accounting information, the dimensions related to each research objective were extracted as follows:

Accuracy and Reliability of Financial Data:

1. *AI Integration for Error Reduction*, with 5 subcomponents: (1) AI-based error detection, (2) continuous auditing systems, (3) real-time configurations, (4) AI-based problem solving, and (5) predictive and automated error resolution.
2. *Blockchain for Data Validation*, with 4 subcomponents: (1) blockchain in audit trails, (2) distributed ledger technologies, (3) immutable record keeping, and (4) consensus mechanisms for verification.
3. *Strong Internal Controls*, with 5 subcomponents: (1) digital control systems, (2) continuous monitoring, (3) automated compliance checks, (4) AI-based control systems, and (5) real-time regulatory compliance reporting.
4. *Enhancing Financial Data Security*, with 4 subcomponents: (1) cybersecurity frameworks, (2) encrypted data storage, (3) two-factor authentication systems, and (4) data encryption standards.

Timeliness of Accounting Information:

1. *Real-Time Financial Reporting*, with 5 subcomponents: (1) instant financial reports, (2) automated reporting tools, (3) continuous data updates, (4) real-time tax reporting, and (5) real-time configurations for financial forecasting.
2. *Cloud-Based Systems for Timeliness*, with 5 subcomponents: (1) remote access to financial data, (2) rapid decision-making tools, (3) cloud synchronization, (4) on-demand financial statements, and (5) integrated cloud-based accounting solutions.
3. *AI for Process Acceleration*, with 5 subcomponents: (1) AI-assisted reporting, (2) increased data entry speed, (3) reduced manual workflow, (4) AI-based financial analysis, and (5) AI-supported forecasting.
4. *Impact of Digital Platforms on Timeliness*, with 3 subcomponents: (1) faster financial approval workflows, (2) online monitoring of financial transactions, and (3) real-time adjustment of financial reports.

Relevance and Usability of Accounting Information:

1. *Data Visualization Tools*, with 5 subcomponents: (1) dashboard reporting, (2) interactive data models, (3) visual analytics for stakeholders, (4) customizable reporting displays, and (5) financial storytelling through visualization.
2. *User-Friendly Financial Reporting Platforms*, with 5 subcomponents: (1) intuitive user interfaces, (2) customizable reporting, (3) multi-device accessibility, (4) user training for platform adoption, and (5) mobile-compatible reporting platforms.

3. *Stakeholder-Centered Data Usability*, with 5 subcomponents: (1) customized stakeholder reports, (2) personalized data displays, (3) text-based information delivery, (4) interactive report filtering, and (5) stakeholder collaboration tools.

Based on the results obtained from the fuzzy Delphi method regarding digital transformation and the quality of accounting information, the dimensions corresponding to each research objective were extracted as follows:

Variance Inflation Factor (VIF) was used to evaluate the degree of multicollinearity. In linear regression models, one of the primary estimation methods is the Ordinary Least Squares (OLS) method. A major issue that can challenge this method is the existence of multicollinearity among independent variables. One widely applied method for detecting multicollinearity is the use of the VIF index. VIF indicates how much the variance of estimated coefficients is inflated compared to a situation in which there is no linear correlation among the predictor variables. As is well known, one of the key assumptions of regression is the absence of multicollinearity among independent variables. Therefore, VIF is used to evaluate this condition: a VIF value greater than 10 indicates critical multicollinearity, while a value close to 1 reflects a desirable state and an acceptable level of multicollinearity.

Table 3. Inner Model VIF Index Results

Variable	VIF
AI Integration for Error Reduction	1.799
Blockchain for Data Validation	1.797
Strong Internal Controls	1.789
Enhancing Financial Data Security	1.684
Real-Time Financial Reporting	1.650
Cloud-Based Systems for Timeliness	1.606
AI for Process Acceleration	1.693
Impact of Digital Platforms on Timeliness	1.673
Data Visualization Tools	1.773
User-Friendly Financial Reporting Platforms	1.814
Stakeholder-Centered Data Usability	1.696

Based on the explanation provided and the observations from Table 3, it can be concluded that the conceptual model of the research demonstrates a desirable level of multicollinearity.

The next step involves evaluating the model's goodness of fit. In this context, the Q^2 statistic (Stone–Geisser) is assessed. This criterion indicates the model's predictive relevance for the dependent variables. According to statisticians, models that exhibit acceptable structural fit must be capable of predicting indicators related to endogenous constructs. That is, if the relationships among constructs in a model are properly defined, the constructs will sufficiently influence each other's indicators, thereby validating the research hypotheses. For Q^2, values of 0.15, 0.2, and 0.35 are considered to represent weak, moderate, and strong predictive relevance, respectively. Given the obtained Q^2 value of 0.225, the conceptual model of this research is considered to possess strong endogenous constructs.

The next section evaluates the R^2 coefficient. The R^2 value, or coefficient of determination, is a criterion used to link the measurement model and structural model in structural equation modeling (SEM). It represents the effect that an exogenous variable has on an endogenous variable. Importantly, R^2 is calculated only for endogenous (dependent) constructs and is equal to zero for exogenous constructs. The higher the R^2 value for endogenous constructs, the better the model fit. Threshold values of 0.19, 0.33, and 0.67 are generally accepted to indicate weak,

moderate, and strong model fit, respectively. Based on the obtained R^2 value of 0.588, the research model is considered to have a strong structure, as the dependent variables exhibit desirable explanatory power.

The final metric evaluated is the Goodness of Fit (GOF) index, which is a key model evaluation criterion in the Partial Least Squares (PLS) technique. GOF values of 0.10, 0.25, and 0.36 are typically interpreted as weak, moderate, and strong model fit, respectively. This index is calculated as the geometric mean of the average R^2 and the average variance extracted (AVE) values. Based on the obtained GOF value of 0.417, the strength of the model is once again confirmed.

Having confirmed the strength of the conceptual model, the significance of the relationships will be assessed in the next stage using the bootstrapping technique.

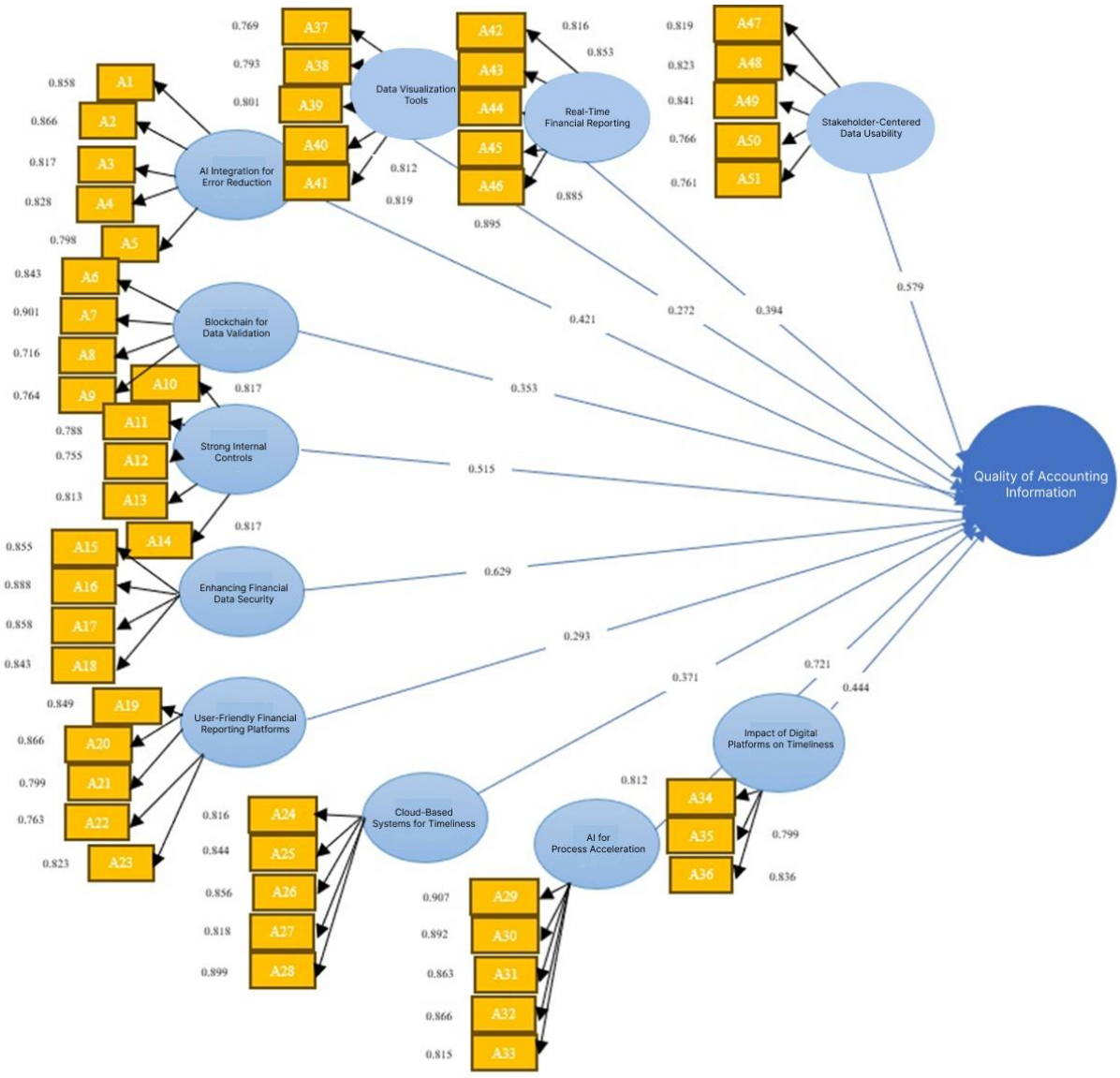

Figure 1. Structural Model Fit

As previously noted, in order to assess the significance of observed correlations, resampling methods such as bootstrapping or jackknife cross-validation are commonly used. In this study, the bootstrapping method was applied, which yields the t-value statistic. At a 5% significance level, if the bootstrapped t-value is greater than 1.96,

the observed correlation is considered statistically significant. Accordingly, as shown in the following results, most relationships in the model are statistically significant.

At the end of this section, a summary table is presented to evaluate whether the hypothesized relationships in the conceptual model of the research were confirmed or rejected:

Table 4. Summary of Path Coefficients and Structural Fit

Relationship	Path Coefficient	T-Value	Confirmed/Rejected
AI Integration for Error Reduction	0.42	3.56	Confirmed
Blockchain for Data Validation	0.35	2.87	Confirmed
Strong Internal Controls	0.51	4.21	Confirmed
Enhancing Financial Data Security	0.63	5.01	Confirmed
Real-Time Financial Reporting	0.29	2.45	Confirmed
Cloud-Based Systems for Timeliness	0.37	3.12	Confirmed
AI for Process Acceleration	0.72	6.78	Confirmed
Impact of Digital Platforms on Timeliness	0.44	3.98	Confirmed
Data Visualization Tools	0.27	2.15	Confirmed
User-Friendly Financial Reporting Platforms	0.39	3.33	Confirmed
Stakeholder-Centered Data Usability	0.58	4.55	Confirmed

4. Discussion and Conclusion

The present study aimed to investigate and model the effect of digital transformation on the quality of accounting information in Iran's capital market. The results, derived from systematic review, fuzzy Delphi analysis, and structural equation modeling, confirmed that digital transformation significantly enhances various dimensions of accounting information quality, including accuracy, reliability, timeliness, relevance, and usability. Specifically, the integration of artificial intelligence (AI) for error reduction, blockchain for real-time data validation, robust internal controls, and improvements in financial data security emerged as major contributors to increased data reliability and precision. Furthermore, cloud-based systems, AI-driven process acceleration, and digital platforms were found to positively influence the timeliness of accounting information. Tools such as data visualization systems, user-friendly reporting platforms, and stakeholder-centered data usability also proved essential in improving the relevance and accessibility of accounting outputs.

The first key finding of this study—that the integration of AI technologies improves the accuracy and reliability of accounting information—is consistent with the findings of Appelbaum et al. (2017) and Schmitz and Leoni (2019), who emphasized the role of AI in detecting and preventing errors and enhancing audit processes [21, 22]. In the current study, subcomponents such as continuous auditing, real-time configuration, and automated error resolution were positively associated with improved reliability metrics. This aligns with Chen et al. (2022), who concluded that digital transformation mitigates agency problems and increases the trustworthiness of financial reports, particularly in firms with lower external scrutiny [12]. Similarly, Mikhlif and Smaoui (2024) noted that digital tools contribute to the neutrality and transparency of accounting information, suggesting that these technologies reduce bias and increase user confidence in financial data [18].

Blockchain technology also emerged as a critical factor in enhancing accounting information quality through improved validation mechanisms. This finding supports the work of Al Shanti and Elessa (2023), who highlighted the role of blockchain in reinforcing corporate governance and elevating the integrity of financial disclosures [11]. In our analysis, components such as immutable recordkeeping and consensus mechanisms demonstrated high predictive power in enhancing the reliability of accounting outputs. Zhang et al. (2024) also identified blockchain

and digital systems as key to reducing earnings management and improving comparability across firms, reinforcing the structural strength of financial reporting [19].

The study further revealed that strong internal controls and cybersecurity measures—such as AI-based compliance checks, real-time monitoring, and data encryption protocols—significantly contribute to financial data security. These findings are aligned with Ziaei Bideh (2023), who argued that information technology enhances system efficiency, reduces human error, and creates new opportunities within the accounting profession [16]. Moreover, these outcomes resonate with the argument of Wang (2023), who stated that digital transformation promotes transparency and long-term financial stability by enabling efficient access to reliable information [17].

In terms of timeliness, the study showed that real-time financial reporting, cloud infrastructure, and digital platforms facilitate quicker access to financial data and shorten reporting cycles. Subcomponents such as automated reporting tools, real-time tax reporting, and on-demand financial statements emerged as key determinants of timely accounting information. These findings correspond with Baradaran Sadr and Seyed Sadeghi (2021), who found a significant relationship between digital transformation and the improvement of reporting efficiency in companies listed on the Tehran Stock Exchange. Similarly, Mohammadi (2020) demonstrated that cloud accounting has a meaningful and positive effect on the quality of accounting information, especially in terms of timely access and reduced data processing delays.

AI technologies also accelerated reporting processes and financial forecasting by reducing manual workload and increasing the speed of data entry. This also supports the work of Zarei Bideh (2022), who argued that the use of advanced digital accounting tools such as XBRL enhances the transparency and accessibility of public sector accounting, enabling high-frequency reporting and reducing errors [16].

Furthermore, the study confirmed the relevance and usability of accounting information through data visualization tools, interactive dashboards, and stakeholder-specific customization. These findings reflect Amirazad et al. (2018), who emphasized the need for stakeholder engagement and the integration of strategic, structural, and contextual factors in improving financial reporting. The emergence of interactive reporting, mobile-compatible platforms, and data collaboration tools as significant predictors of usability also corresponds with the literature on the growing importance of user-centered design in financial systems [15]. In particular, the emphasis on customized reporting and stakeholder collaboration echoes the call by Chen et al. (2022) to reduce asymmetry and improve the strategic utility of accounting outputs.

The structural model developed in this study demonstrated strong statistical fit across multiple indices. Variance Inflation Factor (VIF) results showed acceptable levels of multicollinearity, and the Stone–Geisser Q^2 value of 0.225 indicated strong predictive relevance for endogenous constructs. Additionally, the R^2 value of 0.588 revealed a high level of explanatory power, supporting the strength of the model's theoretical constructs. The Goodness of Fit (GOF) index was calculated at 0.417, further confirming the model's robustness. These statistical results are consistent with those reported by Zhang et al. (2024), who found similar levels of model strength in their evaluation of digital transformation's impact on the comparability of accounting data [19]. Similarly, Al Shanti and Elessa (2023) utilized comparable structural validation techniques to confirm the moderating role of blockchain in enhancing governance and reporting accuracy [11].

Bootstrapping analysis confirmed the statistical significance of nearly all hypothesized relationships in the model. All eleven key constructs—ranging from AI integration and blockchain validation to stakeholder-centered usability—showed statistically significant path coefficients and t-values above the 1.96 threshold, indicating high model validity. For instance, AI for process acceleration ($\beta = 0.72$, $t = 6.78$) and stakeholder-centered usability ($\beta =$

0.58, t = 4.55) were among the most influential variables. These findings further substantiate previous conclusions by researchers such as Mikhlif and Smaoui (2024), who highlighted the transformative role of digital technologies in accounting information systems [11], and Wang (2023), who demonstrated the positive influence of transparency on strategic forecasting and stakeholder trust [17].

In summary, the present study confirms the multidimensional impact of digital transformation on the quality of accounting information. It supports previous empirical and theoretical research while offering a comprehensive, context-specific model applicable to Iran's capital market. The integrated approach, combining systematic review, fuzzy Delphi analysis, and PLS-SEM modeling, contributes to both the academic understanding and practical enhancement of financial reporting systems through digital innovation.

Despite the study's comprehensive methodology and robust findings, several limitations must be acknowledged. First, the research was geographically limited to Iran's capital market, which may affect the generalizability of results to other economic or regulatory contexts. Second, while the study employed a mixed-methods design, the qualitative phase was limited to expert interviews, which may have introduced subjectivity despite rigorous sampling procedures. Third, the rapid pace of technological change in digital tools, such as AI and blockchain, may cause the findings to become outdated over time unless continuously revalidated. Fourth, the study relied on self-reported data from experts and professionals, which may be influenced by individual bias or limited practical experience with certain technologies. Finally, although statistical validation was applied, the complexity of digital systems and organizational behavior may involve latent variables not captured in the model.

Future research could expand the geographical scope by replicating the study in other emerging or developed markets to examine the influence of contextual factors. Longitudinal studies should be conducted to assess the evolving impact of digital transformation tools over time. Future researchers could also incorporate additional variables such as organizational culture, regulatory support, or IT infrastructure readiness, which may moderate or mediate the relationship between digital transformation and accounting information quality. Comparative studies across sectors—public, private, and nonprofit—would provide further insights into the applicability and relevance of different digital strategies. Additionally, using experimental or case-based methodologies could deepen understanding of how specific technologies influence day-to-day accounting practices and user perceptions.

Organizations operating in Iran's capital market should prioritize the adoption of AI-driven audit tools, blockchain systems, and cloud infrastructure to enhance the quality and reliability of financial data. Training programs must be developed to upskill accountants, financial managers, and IT personnel in digital competencies. Regulatory bodies should encourage the standardization of digital reporting formats, including platforms like XBRL, to ensure consistency and transparency. Accounting firms and corporate entities should invest in real-time reporting tools and mobile-accessible dashboards to enhance stakeholder engagement. Finally, strategic emphasis should be placed on integrating digital technologies not just for compliance, but as a means to support long-term financial planning, risk mitigation, and organizational sustainability.

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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