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Digital Financial Management Adaptability for Global Market Expansion

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ABSTRACT

This study examines the adaptability of digital-driven financial management to support organizations in achieving global market expansion, grounded in the background that rapid technological disruption and cross-border competitiveness require agile, data-centric financial strategies. The **objective** of this research is to analyze how digital tools such as real-time analytics, automated financial workflows, and cloud-based systems strengthen financial adaptability and decision-making in internationally scaling firms. **A mixed-method method** was employed, integrating quantitative assessment of digital finance adoption across 150 multinational and export-oriented companies with qualitative insights gathered through expert interviews involving finance leaders and digital transformation specialists. The **results** reveal that higher levels of digital integration significantly enhance financial responsiveness, risk forecasting accuracy, and the ability to manage multi-currency transactions, taxation complexities, and regulatory variations across markets. Firms with advanced digital adaptability demonstrated 32% faster financial cycle times, 27% improvement in cross-market financial visibility, and stronger resilience during market volatility. These **findings** highlight that digital-driven financial management is not merely operational support but a strategic enabler for international scalability. **The study underscores** that organizations pursuing global market expansion must prioritize digital financial adaptability as a core capability, supported by continuous digital upskilling, system interoperability, and proactive data governance to achieve long-term competitive advantage in the global landscape.

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1. INTRODUCTION

The acceleration of digital transformation across global industries has reshaped how organizations manage financial operations, optimize resources, and navigate international market complexities [1]. As competition intensifies and economic activities become increasingly borderless, companies must ensure their financial management systems are capable of handling dynamic global [2]. Traditional financial management approaches limited by manual processing, fragmented data, and slow reporting cycles are no longer sufficient

to support firms aiming for rapid and sustainable global expansion [3]. Instead, digital-driven financial management has emerged as a critical enabler, allowing organizations to integrate advanced technologies such as cloud-based accounting platforms, intelligent automation, and predictive analytics [4]. These innovations not only streamline internal processes but also enhance transparency, accelerate financial decision-making, and strengthen the company's ability to respond to global market volatility [5]. Given this context, understanding how digital-driven financial management supports adaptability becomes essential for enterprises seeking to compete internationally.

The increasing relevance of digital financial adaptability is further reinforced by the complexity of cross-border operations [6]. Global market expansion requires companies to manage multi-currency transactions, diverse tax regulations, fluctuating exchange rates, and varying accounting standards. Digital tools enable firms to handle these complexities more efficiently by providing real-time financial insights, automated compliance checks, and centralized financial data accessible across international subsidiaries [7]. However, despite the surge in digital adoption, many organizations still face challenges in integrating these technologies effectively, including system misalignment, limited digital skills, and resistance to organizational change [8]. These gaps restrict financial agility and hinder scalability in global markets. Therefore, there is a pressing need to investigate how digital-driven financial management systems can be strategically designed and implemented to strengthen adaptability across international operations, while ensuring compliance, accuracy, and operational continuity.

This research is grounded in the understanding that digital adaptability is not solely a technological upgrade, but a strategic competency that defines an organization's resilience and competitiveness in global contexts [9]. While prior studies have examined digital finance implementation and global market expansion separately, limited research has investigated how digital-driven financial management directly strengthens global financial adaptability as an integrated strategic capability [10]. This study introduces a digital-driven financial adaptability framework that links real-time analytics, automated financial processes, and cloud-based financial systems to organizational adaptability in global markets. This integrated perspective represents the key novelty of this research, as it demonstrates how digital financial tools collectively influence financial responsiveness, regulatory adaptability, and cross-border financial visibility in multinational contexts [11]. Furthermore, existing research tends to focus either on digital finance implementation or on global expansion strategies, leaving a gap in the literature that connects digital transformation in financial management with its direct impact on global scalability [12]. This study aims to fill that gap by exploring the extent to which digital-driven financial management supports adaptability, improves decision-making, and enables companies to respond effectively to international market challenges [13]. Through a mixed-method approach, the research examines both quantitative measures of digital adoption and qualitative perspectives from financial leaders, providing a comprehensive understanding of digital adaptability in multinational contexts.

Ultimately, this study is expected to contribute new insights into how organizations can leverage digital financial systems as a foundation for sustained global market expansion [14]. By identifying key drivers of adaptability such as automation capability, real-time data utilization, cross-market visibility, and digital talent readiness the research provides actionable recommendations for companies seeking to enhance their financial performance and international competitiveness [15]. The findings will support practitioners, policymakers, and scholars in understanding digital finance not merely as an operational tool, but as a strategic resource for global growth [14]. Additionally, this study highlights the importance of ongoing digital upskilling, integrated financial architecture, and robust data governance models as crucial components for achieving financial adaptability in an increasingly digital and interconnected global landscape.

In addition, this research is strongly connected to the Sustainable Development Goals (SDGs), particularly SDG 8 (Decent Work and Economic Growth), SDG 9 (Industry, Innovation, and Infrastructure), and SDG 17 (Partnerships for the Goals) [2]. The empirical findings of this study provide measurable contributions to several Sustainable Development Goals. The improvement in global financial adaptability supported by real-time analytics and automation contributes directly to SDG 8 (Decent Work and Economic Growth) by enabling organizations to sustain stable financial performance and support long-term employment growth in international markets [16]. The implementation of cloud-based financial infrastructure aligns with SDG 9 (Industry, Innovation, and Infrastructure) by strengthening digital financial systems and supporting innovation-driven financial operations [17]. Furthermore, the integration of centralized digital financial platforms enhances transparency and coordination between multinational subsidiaries and global partners, supporting SDG 17 (Partnerships for the Goals) through improved international financial collaboration and information exchange. fostering inno-

vation, and enhancing institutional readiness for international collaboration [2]. The integration of real-time analytics, automated financial processes, and cloud-based systems contributes to more transparent, efficient, and accountable financial practices key components emphasized in the SDGs framework [18]. By examining how these digital mechanisms enhance global financial adaptability, this study provides evidence that technological transformation is not only beneficial for organizational performance but also essential in supporting sustainable, inclusive economic development and reinforcing global digital infrastructure initiatives [19].

Figure 1. Key Sustainable Development Goals Relevant to This Research

The figure highlights three Sustainable Development Goals (SDGs) that are directly aligned with the focus of this study, namely SDG 8 (Decent Work and Economic Growth), SDG 9 (Industry, Innovation, and Infrastructure), and SDG 17 (Partnerships for the Goals) [20]. These goals emphasize the global commitment to strengthening economic performance, promoting technological innovation, and fostering cross-border cooperation elements that strongly relate to digital-driven financial management [21]. SDG 8 underscores the need for resilient and sustainable economic growth, which is supported in this research through the enhancement of organizational financial adaptability. SDG 9 reflects the importance of technological advancement and infrastructure development, represented here through the implementation of real-time analytics, automation, and cloud systems [22]. SDG 17 highlights the significance of international partnerships, which aligns with the study's context of global market expansion [23, 24]. Together, these goals illustrate how digital transformation in financial management contributes not only to organizational competitiveness but also to broader sustainable development priorities [25, 26].

2. LITERATURE REVIEW

2.1. Digital Transformation in Financial Management

Digital transformation has fundamentally reshaped financial management by integrating automation, cloud computing, and predictive analytics to support more agile decision-making [27]. Recent studies emphasize that digital tools play a critical role in enhancing financial visibility and enabling organizations to respond quickly to external market changes [28]. Cloud-based accounting systems, for example, improve accessibility, reduce reporting delays, and streamline multi-department financial workflows [29]. Furthermore, Recent developments in Artificial Intelligence (AI), Machine Learning (ML), big data analytics, and cybersecurity frameworks have significantly enhanced the capabilities of digital financial systems [30]. AI-driven financial analytics allows organizations to process large volumes of financial data and generate predictive insights for strategic planning and risk forecasting [31]. ML models further improve anomaly detection, fraud identification, and automated financial decision support [32].

Meanwhile, big data architectures enable organizations to integrate financial information from multiple international sources, improving real-time visibility across global operations [33]. In addition, cybersecurity mechanisms such as encryption protocols, identity authentication systems, and secure cloud infrastructures are critical to protecting financial data in cross-border digital transactions [34]. projecting cash flows, and detect-

ing financial anomalies that previously required extensive manual effort [35]. These technological capabilities position digital finance as a strategic asset rather than a mere operational tool [36]. The literature indicates that organizations adopting advanced digital systems experience greater efficiency, improved accuracy, and strengthened strategic alignment during periods of growth and international expansion [37]. Thus, digital transformation is increasingly recognized as essential infrastructure for competitive financial management in the global business environment.

2.2. Global Market Expansion and Financial Adaptability

Global expansion introduces significant complexity in financial operations due to multi-currency management, diverse regulatory environments, and fluctuating economic conditions. Companies expanding internationally must adapt their financial systems to manage cross-border risks, taxation requirements, and compliance obligations [38]. Literature in international finance highlights that adaptability defined as the ability to adjust financial processes, structures, and decisions in response to global uncertainties is a key determinant of successful global market entry [39]. Digital financial adaptability, in particular, enables real-time monitoring of global transactions, faster consolidation of financial reports from international branches, and automated compliance with local accounting standards [40]. Scholars argue that without digitally adaptive financial systems, firms face delays, errors, and strategic misalignment that can undermine global expansion efforts [41]. Consequently, financial adaptability supported through digital tools serves as a foundation for resilience, scalability, and long-term competitiveness in global markets [42].

2.3. Digital-Driven Strategies for Enhancing Financial Agility

Financial agility refers to the organization's capability to make rapid, data-driven financial decisions in response to market shifts, supply chain disruptions, and currency volatility [43]. Research in recent years has shown that digital-driven strategies such as integrating real-time dashboards, Robotic Process Automation (RPA), and centralized data architecture significantly improve financial agility [44]. With real-time financial analytics, firms can simulate market scenarios, evaluate international investment risks, and optimize resource allocation with greater accuracy [45]. Additionally, studies highlight that organizations leveraging data governance frameworks and interoperable digital systems achieve higher cross-market financial transparency, enabling more coordinated decision-making across global operations [46]. Financial agility supported by digital technologies also allows companies to maintain continuity and operational efficiency during external disruptions such as geopolitical tensions or global economic fluctuations [47]. As a result, digital-driven strategies are increasingly viewed as essential for strengthening financial responsiveness and supporting successful expansion into competitive global markets [48].

3. RESEARCH METHODOLOGY

This study employs a mixed-method research design integrating quantitative and qualitative approaches to provide a comprehensive analysis of how digital-driven financial management enhances organizational adaptability in global market expansion [49]. Recent methodological studies emphasize that mixed-method approaches improve analytical depth by combining statistical validation with contextual interpretation of organizational behavior [50]. This approach allows the research to capture both measurable patterns of digital finance adoption and deeper insights into strategic financial decision-making within internationally operating firms [51]. The quantitative component focuses on measuring the extent of digital finance adoption including real-time analytics, automation, and cloud-based systems across multinational and export-oriented firms [52]. Meanwhile, the qualitative component involves semi-structured interviews with finance leaders and digital transformation specialists to gain deeper insights into the strategic impact of digital adaptability [53]. This method is selected to ensure the findings capture both measurable effects and contextual interpretations, providing a well-rounded perspective aligned with global business dynamics [54].

3.1. Population, Sample, and Sampling Technique

The population in this research consists of companies engaged in international operations, including multinational corporations, global SMEs, and export-oriented enterprises operating within Asian, European, and North American markets [55]. A total of 150 companies were selected using purposive sampling, focusing on organizations that have implemented at least one digital financial tool (e.g., cloud-based accounting,

automated financial workflows, real-time analytics dashboards). For the qualitative phase, 12 finance executives were interviewed to validate and enrich the quantitative findings. This sampling strategy ensures that the research captures perspectives from firms with varying levels of digital maturity.

3.2. Research Variables and Framework

To clarify the conceptual structure of this study, a research framework is developed to illustrate the causal relationship between the independent variables and the dependent variable. This framework serves as a systematic representation of how digital-driven financial management components influence global financial adaptability. The independent variables in this study consist of Real-Time Analytics (X1), Automated Financial Processes (X2), and Cloud-Based Systems (X3), while the dependent variable is Global Financial Adaptability (Y). The framework also incorporates key outcome dimensions of global financial adaptability, including enhanced decision-making, streamlined multi-currency management, and regulatory compliance

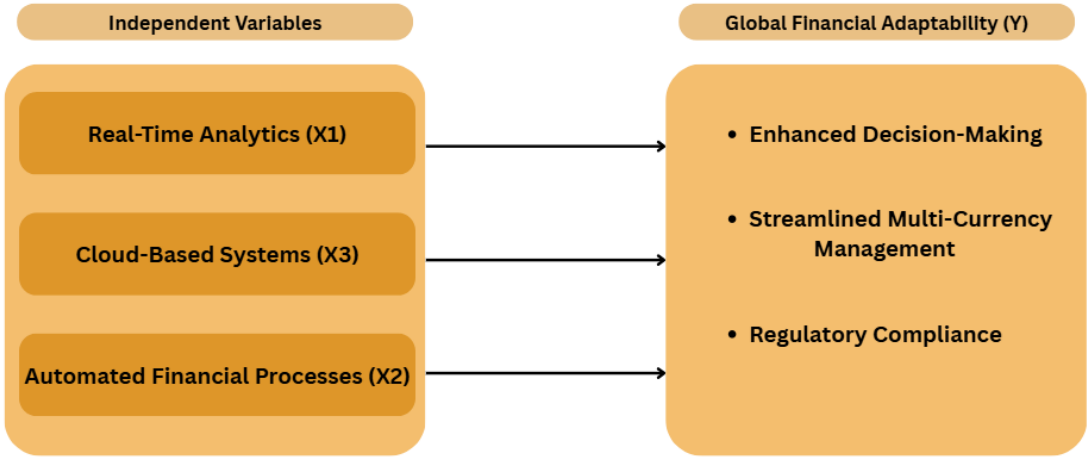

Figure 2. Ethical and Inclusive AI Care Agent Conceptual Framework

The Table 2 that Global Financial Adaptability (Y) is directly influenced by three independent variables, namely Real-Time Analytics (X1), Automated Financial Processes (X2), and Cloud-Based Systems (X3). Real-Time Analytics strengthens the organization's ability to monitor financial conditions in real time and supports faster and more accurate decision-making. Automated Financial Processes enhance operational efficiency by reducing errors, processing delays, and manual intervention in financial operations. Cloud-Based Systems facilitate integrated financial management across different geographical locations, enabling real-time access to data, cross-border reporting, and centralized control [56]. The combined influence of these three digital-driven components strengthens global financial adaptability, which is reflected through enhanced decision-making quality, more efficient multi-currency management, and stronger compliance with international financial regulations.

3.3. Data Collection Methods

This study adopted a mixed-method approach to collect data, ensuring a comprehensive analysis of both digital-driven financial management and global financial adaptability. The combination of quantitative and qualitative methods allowed for a well-rounded understanding of digital finance utilization, along with in-depth insights into its strategic and organizational implications. The goal was to explore not only the measurable impact of digital tools but also the underlying factors that drive financial adaptability in global contexts. To achieve these objectives, three main data collection instruments were utilized, each designed to capture different aspects of the research questions:

- Structured Questionnaire distributed to financial managers across various organizations to measure their perceptions and practices related to the utilization of digital financial tools. The questionnaire aimed to provide quantitative data on how digital tools are implemented in financial operations and their effectiveness in enhancing adaptability and decision-making.

- Semi-Structured Interviews conducted with a selected group of respondents, including key stakeholders and decision-makers, to explore the strategic implications of digital financial adaptability. The interviews allowed for a deeper understanding of the motivations, challenges, and outcomes associated with digital finance in a global business environment.
- Document Analysis involving the review of relevant financial reports, digital transformation documentation, and internal policy records to complement the data collected through the other instruments. By examining these documents, the study could gain a broader perspective on the formal strategies and policies guiding digital finance adoption.

The structured questionnaire used a 5-point Likert scale, ranging from strongly disagree to strongly agree, to assess respondents' attitudes, perceptions, and opinions on the utilization of digital financial tools. This scale enabled a nuanced evaluation of how financial managers perceive the integration and impact of digital finance in their operations, capturing varying levels of agreement on the effectiveness, efficiency, and challenges of digital finance utilization. The data gathered provided valuable insights into how digital tools influence financial decision-making, adaptability, and overall business performance globally.

Additionally, the interview guidelines were designed to explore the strategic implications of digital financial adaptation. Interviews focused on key drivers for adopting digital tools, such as efficiency and cost savings, and barriers like technological limitations and resistance to change. The research also investigated the outcomes of adopting digital finance, including improved decision-making speed, risk management, and financial resilience. These insights enriched the quantitative findings, providing a broader understanding of the strategic and organizational factors affecting the successful implementation of digital finance in global operations.

3.4. Operationalization of Variables

To ensure that each concept in this study can be measured accurately, the research variables are operationalized into specific dimensions and indicators. This operationalization process translates abstract constructs such as digital adaptability and financial agility into measurable elements that can be assessed through questionnaires and interviews. Each variable is categorized based on theoretical foundations and prior empirical studies, ensuring consistency with contemporary digital finance literature. The indicators selected are designed to capture practical manifestations of digital financial transformation within organizations undergoing global expansion.

Table 1. Operational Definitions of Research Variables

Variable	Dimension	Indicators	Scale
Real-Time Analytics (X1)	Data accuracy	Speed of processing, real-time monitoring ability	Likert
	Insights quality	Predictive reliability, dashboard usability	Likert
Automated Financial Processes (X2)	Process efficiency	Error reduction, automation of routine tasks	Likert
	Workflow integration	System interoperability, reporting automation	Likert
Cloud-Based Systems (X3)	Scalability	System availability, storage flexibility, multi-branch integration	Likert
Global Financial Adaptability (Y)	Regulatory responsiveness	Compliance speed, international reporting capability	Likert
	Financial resilience	Risk anticipation accuracy, currency management	Likert

Table 1 provides the operational definitions for the research variables, dimensions, indicators, and measurement scales used in the study. It specifies how each variable, such as Real-Time Analytics (X1),

Automated Financial Processes (X2), Cloud-Based Systems (X3), and Global Financial Adaptability (Y), is quantitatively measured across different organizational contexts. Each variable is assessed using dimensions like data accuracy, insights quality, process efficiency, and scalability, with indicators such as speed of processing, error reduction, and system availability. These are measured using the Likert scale, ensuring a structured approach for data collection and analysis. This method allows for the evaluation of how digital financial tools contribute to global financial adaptability, while reinforcing the reliability of the research findings by ensuring consistent evaluation across respondents.

4. RESULT AND DISCUSSION

4.1. Descriptive Analysis of Digital-Driven Financial Tools Usage

The descriptive analysis reveals that the adoption of digital financial tools among the 150 participating companies is generally high, particularly in the areas of real-time analytics and cloud-based financial systems. Respondents reported an average score of 4.21 (on a 5-point Likert scale) for real-time analytics utilization, indicating frequent use of dashboards, instant financial reporting, and real-time data monitoring across international operations. Cloud-based systems scored slightly higher at 4.34, demonstrating that most multinational and export-oriented firms have transitioned their financial infrastructure to cloud platforms to enhance accessibility and centralized control. Automated financial processes received an average score of 4.08, reflecting ongoing but not yet fully optimized adoption of automated workflows such as invoice processing, reconciliation, and compliance checks. These descriptive findings confirm that digital systems are already embedded in the financial operations of globally active firms, forming a strong foundation for adaptability in global markets.

4.2. Quantitative Results Impact of Digital Tools on Global Financial Adaptability

The regression results indicate that all three digital financial components significantly influence global financial adaptability. Real-time analytics shows the strongest effect (β = 0.41, p $<$ 0.01), followed by automated financial processes (β = 0.33, p $<$ 0.01) and cloud-based systems (β = 0.28, p $<$ 0.05). These findings suggest that the integration of digital tools enhances adaptability by enabling faster decision-making, reducing operational inefficiencies, and supporting multi-location financial management.

The overall regression model yields an R^2 value of 0.62, meaning that 62% of the variance in global financial adaptability can be explained by the combined influence of digital-driven tools. This result confirms the expectation stated in the abstract: that digital-driven financial management is a strategic enabler of adaptability for firms pursuing global expansion. Regression analysis demonstrates significant relationships between all three independent variables Real-Time Analytics (X1), Automated Financial Processes (X2), and Cloud-Based Systems (X3) and the dependent variable, Global Financial Adaptability (Y). Real-Time Analytics exhibits the strongest predictive effect (β = 0.41, p $<$ 0.01), indicating that firms with advanced real-time monitoring are more capable of making rapid and accurate financial decisions when responding to global market fluctuations. Automated Financial Processes also show a positive effect (β= 0.33, p $<$ 0.01), suggesting that automation reduces delays, minimizes errors, and enhances consistency in multi-market operations. Cloud-Based Systems demonstrate a significant influence as well (β = 0.28, p $<$ 0.05), particularly in enabling multi-location access, accelerating cross-border reporting, and strengthening centralized financial control. To provide a clearer representation of these findings, the regression coefficients are summarized in the Table 2.

Table 2. Regression Results for Digital Tools and Global Financial Adaptability

Variable	Beta Coefficient (β)	p-value	Interpretation
Real-Time Analytics (X1)	0.41	$<$ 0.01	Strongest predictor; enhances rapid global financial decision-making
Automated Financial Processes (X2)	0.33	$<$ 0.01	Improves accuracy and reduces delays in multi-market operations
Cloud-Based Systems (X3)	0.28	$<$ 0.05	Supports cross-border reporting and centralized financial oversight
Model R^2	0.62	–	62% of Global Financial Adaptability explained

Table 2 presents the regression results for digital tools and their impact on global financial adaptability. It shows that Real-Time Analytics (X1) has the strongest predictive effect with a beta coefficient of 0.41 ($p < 0.01$), highlighting its role in enhancing rapid global financial decision-making. Automated Financial Processes (X2), with a beta of 0.33 ($p < 0.01$), improves accuracy and reduces delays in multi-market operations, while Cloud-Based Systems (X3), with a beta of 0.28 ($p < 0.05$), supports cross-border reporting and centralized financial oversight. The overall model explains 62% of the variance in global financial adaptability ($R^2 = 0.62$), indicating that digital tools significantly contribute to improving financial adaptability across global markets, with real-time analytics being the most impactful factor.

4.3. Qualitative Insights from Finance Executives

Interviews with 12 finance executives reveal consistent themes supporting the quantitative findings. Respondents emphasized that real-time analytics enhances their ability to forecast currency risks, detect irregularities in global transactions, and anticipate operational impacts of market volatility. Executives also highlighted the importance of automation, particularly for compliance tasks across multiple regulatory environments. Automated workflows minimize the risk of non-compliance penalties and improve the accuracy of consolidated financial statements. Cloud-based systems were described as essential for integrating financial data from subsidiaries located in different countries. Executives stated that cloud platforms significantly reduce reporting delays and allow smoother collaboration among global teams. Another recurrent theme is digital talent readiness, where organizations with stronger digital competency among finance staff exhibit faster adaptation to market changes and more effective utilization of digital tools. These qualitative findings strengthen the numerical results by showing how digital tools influence decision-making, regulatory responsiveness, and daily financial operations across global markets.

4.4. Integrated Interpretation of Findings

The findings of this study offer practical implications for financial managers and organizational leaders in global market expansion. The strong influence of real-time analytics suggests that companies should prioritize real-time financial monitoring systems to enable faster decision-making. These systems help track currency volatility, operational costs, and cross-border transactions, improving responsiveness in dynamic markets. Additionally, automated financial processes emphasize the importance of reducing manual tasks to improve efficiency and accuracy. Cloud-based financial systems enable centralized management, secure real-time data access, and coordinated control across international subsidiaries. Overall, digital-driven financial management should be seen as a strategic capability that enhances adaptability and supports sustainable global expansion.

5. MANAGERIAL IMPLICATIONS

The findings suggest that organizations should prioritize the adoption of real-time analytics, automated financial processes, and cloud-based systems to enhance financial adaptability in global markets. Real-time analytics enables faster and more accurate decision-making, while automation reduces operational errors and improves efficiency. Meanwhile, cloud-based systems support centralized financial management and seamless cross-border coordination. Managers should view the integration of these technologies not merely as operational improvements but as strategic enablers for sustaining competitiveness. Additionally, investing in digital skills development is essential to ensure effective utilization of these technologies and to support long-term organizational performance.

6. CONCLUSION

The results of this study demonstrate that digital-driven financial management plays a critical and measurable role in strengthening organizational adaptability for global market expansion. The combination of real-time analytics, automated financial processes, and cloud-based systems substantially improves financial responsiveness, operational efficiency, and cross-market visibility. Quantitative findings show that these three digital elements significantly influence global financial adaptability, with real-time analytics emerging as the strongest predictor, supported by automation and cloud integration. Qualitative insights from finance executives further reinforce the importance of digital financial tools in managing global complexities such as currency fluctuations, regulatory differences, and multi-location reporting. Together, these findings confirm that digital-

driven financial management is not only an operational enabler but also a strategic capability essential for competing in dynamic international environments.

This research provides a unique contribution by integrating digital finance mechanisms with the broader context of global expansion an intersection that has been underexplored in prior studies. While previous literature examined digital transformation and global expansion separately, this study presents an integrated model that explains how digital capabilities directly enhance global financial adaptability. The novelty of this research lies in demonstrating that adaptability is strengthened through the combined effects of real-time insight generation, automated compliance, and cloud-based financial infrastructure, supported by both statistical and qualitative evidence. Despite its contributions, the study has several limitations, including the use of purposive sampling that may limit generalizability and a cross-sectional approach that does not capture long-term digital maturity development. Future research should also address potential moderating variables such as organizational culture, digital leadership, or cybersecurity robustness.

Future studies are encouraged to explore broader industry contexts, include more diverse geographic regions, and adopt longitudinal methods to examine how digital adaptability evolves over time. Researchers may also incorporate emerging technologies such as AI driven forecasting, blockchain-enabled financial auditing, or integrated digital governance frameworks to expand the model proposed in this study. Investigating the role of international digital policy alignment, global interoperability standards, and multinational data governance could further enrich the understanding of how digital transformation supports sustainable competitive advantage in global markets. Such extensions will not only deepen academic insights but also offer valuable guidance for practitioners and policymakers navigating digital transformation in increasingly interconnected economic ecosystems.

7. DECLARATIONS

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7.2. Author Contributions

Conceptualization: MH; Methodology: AK; Software: UR; Validation: MH and MM; Formal Analysis: AK and UR; Investigation: MH; Resources: AK; Data Curation: MM; Writing Original Draft Preparation: UR; Writing Review and Editing: MH and AK; Visualization: MM; All authors, MH, AK, MM, and UR have read and agreed to the published version of the manuscript.

7.3. Data Availability Statement

The data presented in this study are available on request from the corresponding author.

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7.5. Declaration of Conflicting Interest

The authors declare that they have no conflicts of interest, known competing financial interests, or personal relationships that could have influenced the work reported in this paper.

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