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Data Analytics Capability, Digital Accounting, and Financial Management Transformation in Digital Food & Beverage MSMEs

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ABSTRACT

This study examines the effects of human resource competence, regulatory compliance, and internal control on financial reporting quality and investigates the subsequent effect of financial reporting quality on managerial decision-making in vertical hospitals under the Ministry of Health of the Republic of Indonesia. A quantitative approach with a causal research design was employed. Primary data were collected through structured questionnaires distributed to 37 financial reporting staff selected using a saturated sampling technique. The data were analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM) with SmartPLS 4. The results indicate that regulatory compliance has a positive and significant effect on financial reporting quality, whereas human resource competence and internal control do not have significant effects. Furthermore, financial reporting quality has a positive and significant effect on managerial decision-making, indicating that reliable, relevant, and accurate financial information supports more effective managerial decisions. These findings suggest that compliance with accounting standards and applicable regulatory requirements plays a more prominent role in enhancing financial reporting quality than individual competence and internal control mechanisms within the observed institutional context. The study contributes to the public sector accounting literature by providing empirical evidence on the determinants of financial reporting quality in government-affiliated hospitals and its implications for managerial decision-making. Practically, the findings highlight the importance of strengthening regulatory compliance and improving financial reporting processes. The study is limited by its small sample and sector-specific setting; future research should employ larger samples and broader institutional contexts.

1. Introduction

The era of digitalization has fundamentally transformed financial management practices across various business sectors, including Food & Beverage (F&B) Micro, Small, and Medium Enterprises (MSMEs), which must simultaneously fulfill social service missions and maintain business sustainability. Digital transformation has increasingly encouraged MSMEs to shift from conventional financial recording toward integrated, data-driven, and technology-enabled financial management. In this environment, MSMEs are required not only to compete through the quality of products and services offered but also through transparent, efficient, accurate, and accountable financial governance. The transformation of financial management from manual recording into an integrated digital system is therefore becoming increasingly important, particularly as business competition, transaction complexity, and stakeholder expectations continue to increase.

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Globally, digital technologies have become an important instrument for improving business efficiency, information quality, and decision-making. For MSMEs, the utilization of digital technologies can facilitate the collection, processing, storage, and presentation of financial information, enabling business owners to make more timely and informed decisions. Digital accounting and accounting information systems (AIS) have consequently become increasingly relevant because they provide an infrastructure for integrating financial transactions with operational activities. However, the availability of technology does not necessarily guarantee its effective implementation. Differences in technological readiness, managerial capability, financial resources, and data analytics competence may create a gap between technology awareness and actual utilization.

In Indonesia, the digitalization of MSMEs has developed rapidly. More than 60% of MSMEs have started adopting technology in their business processes, supported by government initiatives such as digital onboarding (Rustiyana et al., 2026). Nevertheless, more than 50% of MSMEs continue to conduct financial recording manually, while only approximately 30% utilize information technology for business operations, including financial recording (Kusumawardhani et al., 2023). This condition illustrates a substantial gap between awareness of digital technology and the capacity to implement it effectively. Consequently, digital transformation in MSME financial management should not merely be viewed as the adoption of technological tools but also as a transformation of how financial information is generated, analyzed, and utilized for managerial decision-making.

The issue becomes particularly important in the F&B sector because its operational characteristics create relatively complex financial management requirements. In Medan City, the realization of People's Business Loans (KUR) for the F&B sector reached IDR 2.3 trillion by October 31, 2025, involving approximately 45,000 F&B MSME debtors. This substantial economic potential has not been fully accompanied by adequate adoption of digital accounting information systems, particularly among digital-based F&B MSMEs (Fitrianisa et al., 2023). Medan has more than 50,000 registered F&B MSMEs, yet only around 30% have adopted digital accounting systems. The sector faces greater financial management complexity because transactions may originate from multiple channels, including online orders, dine-in services, and delivery platforms. High transaction frequency, diverse revenue sources, substantial cash flows, and increasing demands for financial transparency further emphasize the need for reliable digital financial management.

The increasing complexity of financial management is also associated with the growing importance of transparency, accountability, and internal control. Previous research demonstrates that accounting information systems can play an important role in supporting organizational control and operational effectiveness. Studies show that quality accounting information systems have a significant mediating effect on the quality of internal control and operational effectiveness of services (Kaplan & Witkowski, 2014). This finding indicates that AIS should not be considered merely as a technological mechanism for recording transactions but as an organizational infrastructure capable of connecting financial information, internal control, and operational processes.

One important capability supporting digital financial transformation is data analytics. The IMA 2025 competency framework emphasizes that technology, particularly data analytics, has become central to the competencies required of accounting professionals, with emerging domains including data analytics and insights and digital transformation (Venkatesh et al., 2023). Data analytics can generally be categorized into four levels: descriptive, diagnostic, predictive, and prescriptive analytics. In the MSME context,

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these capabilities enable businesses to move beyond simply recording historical transactions toward identifying patterns, diagnosing problems, predicting potential outcomes, and supporting more strategic decisions. The adoption of analytics technology has been shown to improve efficiency, accuracy, transparency, and internal control, thereby reducing opportunities for fund misuse.

Alongside data analytics, digital accounting represents another important dimension of financial transformation. Digital accounting refers to the utilization of electronic systems to manage financial data, workflows, reporting, and compliance through cloud-based or on-premises platforms (Rahmawati et al., 2026). The digitalization of accounting can improve operational efficiency, reduce human error, facilitate financial reporting, and support managerial decision-making (Anggadini et al., 2025). Therefore, digital accounting is increasingly important for F&B MSMEs that must process large numbers of transactions across different sales channels while maintaining reliable and timely financial information.

The accounting information system serves as the technical and organizational foundation connecting digital accounting practices with financial management activities. Empirical evidence from Koboko Municipality indicates that AIS utilization contributes significantly to the speed and accuracy of financial statements (Risma, 2025). Similarly, research using SEM-PLS involving 217 MSMEs found that AIS had a positive influence on decision-making success and non-financial performance (Hasibuan, 2024). These findings suggest that the effectiveness of financial transformation may depend not only on whether MSMEs adopt digital accounting technologies but also on their ability to integrate such technologies into an effective accounting information system.

Technology adoption itself is influenced by multidimensional driving and inhibiting factors. Research examining the adoption of cloud-based accounting systems (CBAS) among Indonesian F&B MSMEs, particularly in Medan, confirms a significant positive effect on profitability, liquidity, and cost efficiency (Putri et al., 2025). Furthermore, research involving 398 MSMEs demonstrated that the integration of technologies such as Enterprise Resource Planning (ERP) and business intelligence tools improved decision-making efficiency (Nassani et al., 2023). These findings reinforce the importance of technological integration while also indicating that different digital capabilities may contribute to financial management transformation through interconnected mechanisms.

Despite these developments, an important research gap remains. Existing studies have generally examined AIS, digital accounting, data analytics, or technology adoption as relatively separate issues. Limited research has specifically investigated the interaction between data analytics capability and digital accounting in transforming MSME financial management through AIS. Furthermore, much of the existing MSME literature focuses on general business sectors, trade, or manufacturing, whereas F&B MSMEs remain relatively underexamined despite their distinctive transaction characteristics and high financial complexity. There is also limited empirical evidence testing data analytics capability, digital accounting, and AIS simultaneously within an integrated model, particularly in the context of digital-based F&B MSMEs in Medan City. Therefore, the existing literature does not yet sufficiently explain how digital capabilities are translated into financial management transformation through the mediating role of AIS.

Based on this gap, the specific research problem addressed in this study is whether and to what extent data analytics capability and digital accounting influence the transformation of MSME financial management, and whether accounting information systems mediate these relationships among digital-based F&B MSMEs in Medan City. Accordingly, this study aims to

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examine the influence of data analytics capability and digital accounting on the transformation of MSME financial management, with accounting information systems positioned as a mediating variable. More specifically, the study seeks to determine whether stronger data analytics capabilities and digital accounting practices contribute to improved financial management transformation and whether AIS provides a mechanism through which these digital capabilities generate such transformation.

Theoretically, this study contributes to the development of accounting and information systems literature by integrating data analytics capability, digital accounting, and AIS into a comprehensive framework for explaining financial management transformation in MSMEs. The study extends previous research by examining the mediating role of AIS rather than treating technological capabilities as isolated determinants of organizational outcomes. Practically, the findings are expected to provide useful recommendations for F&B MSME owners and managers in designing appropriate digital financial transformation strategies, strengthening accounting information systems, improving financial transparency, and supporting evidence-based decision-making. The findings may also provide insights for policymakers and other stakeholders in developing digitalization programs that address not only technology adoption but also the capabilities required for effective implementation.

The novelty of this study lies in its integrated examination of data analytics capability and digital accounting as antecedents of MSME financial management transformation through AIS, with digital-based F&B MSMEs in Medan City as the research context. By focusing on an economically significant sector characterized by high transaction frequency, multiple revenue channels, and substantial financial management complexity, this study seeks to provide a more contextualized explanation of how digital capabilities can be transformed into effective financial management practices. Thus, the study is expected to enrich accounting science while offering practical evidence for accelerating sustainable and technology-driven financial transformation among F&B MSMEs.

2. Literature Review

2.1 Conceptual and Theoretical Foundations

2.1.1 Concept and Dimensions of Data Analytics Capability in Financial Management

Data analytics capability is defined as an organization's capacity to systematically manage, process, and analyze large amounts of data to generate insights that support strategic decision-making. In the context of F&B MSMEs in Medan, this ability is becoming increasingly important along with the increasing volume of financial transaction data that must be managed in real-time. Studies conducted by (Pertiwi & Hana, 2025) shows that the application of data-driven decision-making (DDDM) through free analytics platforms such as Google Data Studio and Microsoft Excel is able to provide critical insights for MSMEs, including the identification of weekly net cash flow and the calculation of Return On Investment (ROI) which reaches 220% of digital promotion campaign simulations. These findings confirm that with adequate training, MSMEs can move from intuitive-based decision-making to data-driven decisions, ultimately improving operational efficiency and financial planning.

Furthermore, data analytics capabilities not only serve as complementary tools but have become at the core of the capabilities of modern accounting professionals. The Institute of Management Accountants (IMA) through the 2025 management accounting competency framework explicitly includes data analytics and insights as the main competency domain, in addition to emerging technologies in accounting and digital transformation and innovation. The levels of data analytics in

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financial management include descriptive analytics (what has happened), diagnostic (why it happened), predictive (what will happen), and prescriptive (what actions to take) (Santoso et al., 2026). The implementation of these four levels allows MSMEs to not only report past financial positions, but also forecast future cash flows and respond to potential financial risks more quickly and accurately.

From a Resource-Based View (RBV), data analytics capability can be understood as a strategic organizational resource because it enables MSMEs to convert financial and operational data into valuable information that competitors may not be able to utilize in the same manner. The value of analytics therefore does not merely arise from possessing digital tools, but from the organizational capability to integrate, interpret, and utilize data in business processes. This perspective explains why differences in analytics capability can lead to differences in the effectiveness of financial information systems. When MSMEs possess stronger analytics capabilities, they are better positioned to configure and utilize AIS to transform transaction data into timely, relevant, and actionable financial information. Thus, data analytics capability provides a theoretical basis for expecting a positive relationship between Data Analytics Capability and AIS.

This relationship can also be explained through Dynamic Capability Theory, which views organizational capabilities as the ability to sense changes, seize opportunities, and reconfigure resources in response to a dynamic environment. For digital-based F&B MSMEs, the ability to analyze transaction, sales, inventory, and cash-flow data enables managers to identify financial conditions and respond more rapidly. Consequently, analytics capability can stimulate changes in the way financial information is collected, processed, and utilized, making AIS an important organizational mechanism for converting analytical capability into financial management transformation.

2.1.2 Digital Accounting and Its Role in MSME Financial Transformation

Digital accounting is the use of electronic technology to manage the entire financial cycle, from transaction recording, invoice processing, reporting, to regulatory compliance. Unlike manual systems, digital accounting allows for workflow automation, cloud-based document storage, and real-time data integration across organizational functions. (Payamta, 2023) defines digital accounting as a system in which financial documents are captured, processed, and stored digitally in a secure platform, thus simplifying processes such as monthly closures and audits. Empirical findings from (Kusumawardhani et al., 2024) prove that the digitization of accounting systems has a positive effect on the accuracy, timeliness of accounting information, and cost reduction in Indonesian F&B MSMEs, and these two variables in turn increase the effectiveness of management decision-making.

The relationship between Digital Accounting and AIS can be theoretically explained using the Technology–Organization–Environment (TOE) framework. From the technological dimension, digital accounting provides technological capabilities for recording, processing, integrating, and reporting financial transactions. From the organizational dimension, its effectiveness depends on organizational readiness, human resources, and managerial support. From the environmental dimension, stakeholder pressure and regulatory requirements can encourage MSMEs to adopt more structured digital accounting practices. Therefore, digital accounting should not be viewed merely as the replacement of paper-based accounting, but as a technological and organizational mechanism that strengthens the functionality and utilization of AIS.

In the context of Indonesian MSMEs, the adoption of digital accounting still faces challenges but shows a significant upward trend. Research by Andayani et al. (2026) About the adoption of cloud accounting in

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Indonesian MSMEs revealed that MSMEs adopt cloud accounting mainly to improve efficiency, transparency, real-time reporting, and operational flexibility. The study also found that factors such as organizational readiness, stakeholder pressure, and regulatory compliance are the main drivers of cloud accounting adoption, while data security factors and owner characteristics show positive but not statistically significant influences. This finding is relevant for digital-based F&B MSMEs in Medan who need to consider not only the technical benefits of digital accounting but also the internal readiness of the organization in adopting the technology.

These findings provide a stronger theoretical rationale for H2 because digital accounting creates the technological conditions through which AIS can operate more effectively. At the same time, digital accounting can directly influence financial management transformation by reducing manual processing, increasing information timeliness, and supporting more integrated financial decision-making.

2.1.3 Accounting Information Systems as the Foundation of Financial Digitalization

An Accounting Information Systems (AIS) acts as a technical infrastructure that connects raw data with informative and reliable financial statements. SIA not only records transactions, but also integrates various modules (such as accounts receivable, payable, inventory, and cash) into a single system that can be accessed simultaneously by authorized users. Systematic literature review conducted by (Tenriwali et al., 2026) by analyzing 15 Google Scholar-indexed scientific articles for the period 2018–2025, it was concluded that the use of Management Information Systems (SIM) and Accounting Information Systems (AIS) has a significant effect on improving business process efficiency, accuracy of financial records, and accuracy of decision-making in F&B MSMEs in Medan. Furthermore, the findings also confirm that the success of MSME digitalization is greatly influenced by the readiness of technology, human resource capacity, and support of the business environment.

In the MSME sector, the implementation of SIA has its own complexity because it has to accommodate various sources of income and very dynamic operational expenses. Research on the F&B MSME sector in Medan proves that the simultaneous implementation of accounting information systems and internal control has a positive effect on the quality of financial statements, which in turn supports the improvement of business performance and organizational sustainability (Hayati et al., 2025). Meanwhile, a systematic literature review by (Sari et al., 2025) which analyzes the factors that affect the performance of SIA in MSMEs in Medan City identifies that user involvement factors, top management support, human resource capabilities, and education and training programs are the main determining factors for the success of SIA implementation in MSMEs in Medan City. Thus, SIA is not just an accounting software, but a strategic foundation that determines the quality of financial statements and the effectiveness of internal controls.

Theoretically, AIS occupies a central position in the proposed model because it represents the organizational mechanism through which digital resources are transformed into improved financial management practices. In the RBV perspective, AIS enables firms to exploit valuable information resources, while from the TOE perspective, AIS represents the organizational and technological infrastructure required to operationalize digital technologies. Therefore, AIS is expected to function not only as an outcome of Data Analytics Capability and Digital Accounting but also as an important mechanism through which these capabilities contribute to Financial Management Transformation.

This theoretical position provides the basis for examining AIS as a mediating variable. Data analytics capability and digital accounting

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may provide resources and technologies, but their effects on financial management transformation are unlikely to be fully realized unless those resources are integrated into an effective information system. Accordingly, the mediating role of AIS is conceptually important because it explains the process through which digital capabilities are translated into organizational financial transformation.

2.1.4 Transformation of MSME Financial Management in the Digital Era

Financial management transformation is a fundamental process of paradigm change from manual and discrete recording systems to integrated, real-time, and data-based systems. This process includes not only the adoption of technology, but also changes to operational procedures, organizational structures, as well as the mindset of the human resources involved. Research by (Ardaniswara, 2025) who analyzed 350 culinary MSMEs in Malang City with the PLS-SEM approach found that digital transformation has a positive influence on the financial performance of F&B MSMEs, and that financial performance depends more on the internal ability of managers to optimize the use of capital and utilize digital technology than on external government support. These findings confirm that the transformation of financial management is an endogenous process that requires the initiative and internal capabilities of the organization.

In the context of Medan City, especially digital-based F&B MSMEs, the dynamics of digitalization and financial management of MSMEs show a positive trend in the adoption of financial technology (fintech), especially for digital payment services and alternative financing, which has a significant impact on operational efficiency and access to financing (Affandi et al., 2025). However, this study also identifies that the success of MSME digital transformation still faces challenges such as limited infrastructure and digital literacy, so it requires effective technology integration and comprehensive digital ecosystem support.

This is in line with the findings (Putri et al., 2025) which uses the Technology-Organization-Environment (TOE) framework and proves that IT infrastructure, organizational readiness, stakeholder pressure, and regulatory compliance significantly affect the adoption of cloud accounting, ultimately improving the quality of MSME financial statements. Thus, the transformation of MSME financial management, including F&B MSMEs in North Sumatra, is the result of an interaction between data analytics capabilities, digital accounting adoption, and accounting information system infrastructure supported by organizational readiness and a conducive external environment.

From the Dynamic Capability perspective, Financial Management Transformation represents an organizational outcome of sensing financial conditions, seizing digital opportunities, and reconfiguring financial processes. Data Analytics Capability supports the sensing function by generating insights from financial data, Digital Accounting supports the seizing and implementation of digital processes, while AIS provides the infrastructure for integrating these resources into routine financial activities. This theoretical linkage suggests that financial transformation is not simply the consequence of technology adoption, but the result of an organization's ability to integrate and reconfigure technological resources into more effective financial management processes.

Therefore, the proposed model combines complementary theoretical perspectives. RBV explains why Data Analytics Capability and Digital Accounting can constitute valuable organizational resources; TOE explains how technological, organizational, and environmental conditions shape digital accounting and AIS utilization; and Dynamic Capability Theory explains how these resources can be transformed into organizational changes in financial management. The integration of these perspectives provides a stronger theoretical

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foundation for the relationships proposed in H1–H7.

2.2 Review of Empirical Studies

Recent studies have emphasized the growing importance of data analytics capability in enhancing financial decision-making and organizational performance. In the context of MSMEs, Pertiwi and Hana (2025) demonstrated that the implementation of data-driven decision-making (DDDM) through accessible analytics platforms such as Google Data Studio and Microsoft Excel enabled MSMEs to identify weekly cash flow patterns and evaluate investment performance effectively. Their findings indicated that MSMEs can shift from intuition-based decisions toward evidence-based financial planning when supported by adequate analytical capabilities. Furthermore, Santoso et al. (2026) highlighted that modern financial management increasingly relies on descriptive, diagnostic, predictive, and prescriptive analytics to improve forecasting accuracy and risk management.

Taken together, these findings suggest that Data Analytics Capability provides more than informational benefits. It creates an organizational ability to process and interpret financial information, which requires an appropriate information-system infrastructure. However, existing empirical evidence has not sufficiently established whether AIS functions as the mechanism that converts analytics capability into broader financial management transformation. This creates an important relationship to be tested in the present study.

Digital accounting has also emerged as a critical enabler of financial transformation. According to Payamta (2023), digital accounting facilitates the automation of financial processes, cloud-based document management, and real-time financial reporting. Empirical evidence from Kusumawardhani et al. (2024) revealed that accounting digitalization significantly improves the accuracy and timeliness of accounting information while reducing operational costs among Indonesian F&B MSMEs. Similarly, (Andayani et al., 2026) found that cloud accounting adoption among Indonesian MSMEs enhances efficiency, transparency, and reporting flexibility. Their study further identified organizational readiness, stakeholder pressure, and regulatory compliance as important determinants of successful implementation.

These findings support the argument that Digital Accounting can strengthen AIS because digital accounting requires integrated mechanisms for transaction processing, information storage, reporting, and control. At the same time, the evidence indicates that the benefits of digital accounting depend on organizational readiness and supporting infrastructure. Thus, the effect of Digital Accounting on Financial Management Transformation may operate partly through AIS rather than exclusively through a direct relationship.

The role of Accounting Information Systems (AIS) has also been widely examined in MSME settings. A systematic literature review conducted by Tenriwali et al. (2026), synthesizing findings from studies published between 2018 and 2025, concluded that AIS implementation contributes significantly to business process efficiency, financial reporting accuracy, and managerial decision quality. Likewise, Hayati et al. (2025) reported that AIS and internal control systems jointly improve the quality of financial statements and organizational performance in the MSME sector. Supporting these findings, Sari et al. (2025) identified user involvement, management support, human resource competence, and training programs as critical success factors influencing AIS performance.

The empirical evidence therefore indicates that AIS is closely connected with the organizational processes required for financial transformation. Nevertheless, the existing studies primarily emphasize AIS implementation and performance outcomes rather than positioning AIS as a mediating mechanism between specific digital capabilities

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and financial management transformation. This distinction is important because mediation analysis can explain not only whether digital capabilities matter, but also how their effects are transmitted through an accounting information infrastructure.

Studies examining financial management transformation consistently highlight the importance of digital technologies and organizational capabilities. Ardaniswara (2025) found that digital transformation positively affects the financial performance of culinary MSMEs, with managerial capability playing a more influential role than external support. In addition, (Affandi et al., 2025) demonstrated that fintech adoption improves operational efficiency and access to financing among MSMEs. Similarly, Putri et al. (2025), using the Technology–Organization–Environment (TOE) framework, confirmed that IT infrastructure, organizational readiness, stakeholder pressure, and regulatory compliance significantly influence cloud accounting adoption and financial reporting quality.

However, these findings also reveal that digital transformation outcomes are contingent upon organizational capabilities and technological infrastructure. The evidence is therefore not sufficiently explained by a simple technology-adoption argument. From the combined RBV, TOE, and Dynamic Capability perspectives, the transformation process requires valuable digital resources, organizational readiness, and the capability to integrate those resources into operational systems. AIS provides the connecting mechanism among these conditions.

2.3 Identification of the Research Gap

The synthesis of previous studies reveals several important research gaps.

First, a theoretical gap exists because previous studies have provided strong evidence concerning the benefits of digital technologies but have offered limited explanation of the organizational mechanism through which Data Analytics Capability and Digital Accounting are converted into Financial Management Transformation. The present study addresses this limitation by integrating RBV, TOE, and Dynamic Capability Theory. RBV explains the strategic value of analytics and digital accounting resources, TOE explains the technological and organizational conditions supporting their adoption, while Dynamic Capability Theory explains the transformation of those resources into improved financial management processes.

Second, an empirical gap concerns the role of AIS. Existing studies have demonstrated that Data Analytics Capability can improve financial decision-making (Pertiwi & Hana, 2025; Santoso et al., 2026), that Digital Accounting can improve accounting information and efficiency (Payamta, 2023; Kusumawardhani et al., 2024; Andayani et al., 2026), and that AIS contributes to reporting quality and business efficiency (Tenriwali et al., 2026; Hayati et al., 2025; Sari et al., 2025). However, these streams of evidence have rarely been integrated to test whether AIS mediates the effects of Data Analytics Capability and Digital Accounting on Financial Management Transformation. The mediation mechanism therefore remains empirically underexplored.

Third, a contextual gap remains in relation to digital-based F&B MSMEs. Existing evidence includes general MSMEs, culinary MSMEs, and MSMEs in different locations, including studies in Malang and Medan. However, the characteristics of digital-based F&B MSMEs—such as high transaction frequency, rapid inventory turnover, frequent digital payments, and the need for real-time financial information—create a context in which the integration of analytics, digital accounting, and AIS may operate differently from other MSME sectors. Therefore, findings from general MSMEs cannot automatically be generalized to digital-based F&B MSMEs in Medan City.

Fourth, a methodological gap is evident in the tendency of prior studies to focus on direct effects, adoption determinants, or

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systematic literature reviews. For example, Tenriwali et al. (2026) provides a systematic synthesis rather than primary empirical testing of an integrated causal model, while Putri et al. (2025) emphasizes determinants of cloud accounting adoption. Although these studies provide valuable evidence, they do not simultaneously test the direct and indirect relationships among Data Analytics Capability, Digital Accounting, AIS, and Financial Management Transformation. The present study therefore extends the literature by empirically testing both direct effects and AIS-mediated effects within a single integrated model.

Accordingly, the novelty of this study does not merely arise from combining variables that have previously been studied separately. Rather, it lies in explaining and testing the mechanism through which two digital capabilities—Data Analytics Capability and Digital Accounting—contribute to Financial Management Transformation, with AIS positioned as the organizational and technological mechanism connecting digital resources to transformation outcomes in digital-based F&B MSMEs in Medan City.

2.4 Development of the Conceptual Framework

The conceptual framework is derived from the integration of RBV, TOE, and Dynamic Capability Theory. Data Analytics Capability is positioned as a valuable organizational capability that enables MSMEs to generate and interpret financial insights. Digital Accounting is positioned as a technological capability that facilitates automated and integrated accounting processes. In accordance with RBV and TOE, both capabilities are expected to strengthen the utilization and effectiveness of AIS. AIS subsequently functions as the mechanism that integrates data, accounting processes, and information outputs, thereby supporting Financial Management Transformation.

The model also proposes direct relationships from Data Analytics Capability and Digital Accounting to Financial Management Transformation. These direct paths are theoretically justified because organizations may use analytical insights and digital accounting practices to improve financial planning, monitoring, reporting, and decision-making without the entire effect necessarily passing through AIS. At the same time, the indirect paths recognize that the transformation process may become stronger when these capabilities are institutionalized through an effective AIS.

Thus, the conceptual framework distinguishes between direct capability effects and system-mediated effects. This distinction enables the study to determine whether AIS merely accompanies digital transformation or actually serves as a mechanism through which digital capabilities generate broader changes in financial management.

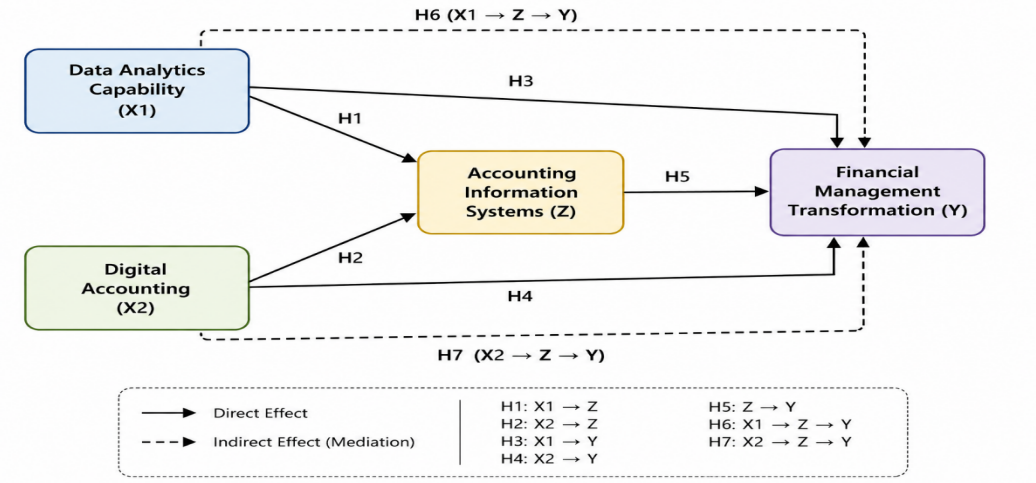

Fig 1. Conceptual Framework

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2.5 Hypotheses Development

2.5.1 Data Analytics Capability and Accounting Information Systems

From the RBV perspective, Data Analytics Capability constitutes a valuable organizational capability because it enables MSMEs to convert large volumes of financial and operational data into useful information. However, the effective utilization of analytical capability requires systems capable of collecting, processing, integrating, and delivering information. AIS provides this infrastructure. Empirically, Pertiwi and Hana (2025) demonstrates that data-driven decision-making enables MSMEs to extract useful financial insights, while Santoso et al. (2026) emphasizes the increasing role of analytics in financial management. These findings suggest that stronger analytics capability creates greater demand for and utilization of integrated accounting information systems.

H1: Data Analytics Capability positively affects Accounting Information Systems.

2.5.2 Digital Accounting and Accounting Information Systems

The TOE framework explains that digital accounting adoption is influenced by technological and organizational conditions. Digital accounting requires systems that can automate transactions, integrate financial information, and provide timely reports. The findings of Payamta (2023), Kusumawardhani et al. (2024), and Andayani et al. (2026) demonstrate the importance of digital accounting for automation, information accuracy, efficiency, transparency, and real-time reporting. Therefore, greater adoption of digital accounting is expected to strengthen the implementation and utilization of AIS.

H2: Digital Accounting positively affects Accounting Information Systems.

2.5.3 Data Analytics Capability and Financial Management Transformation

Dynamic Capability Theory suggests that organizations can transform their processes when they are capable of sensing changes and utilizing information to respond to opportunities and risks. Data Analytics Capability supports this process by enabling MSMEs to identify financial patterns, forecast conditions, and make evidence-based decisions. The findings of Pertiwi and Hana (2025) and Santoso et al. (2026) support the contribution of analytics to financial planning, forecasting, and risk management. Accordingly, stronger Data Analytics Capability is expected to directly enhance Financial Management Transformation.

H3: Data Analytics Capability positively affects Financial Management Transformation.

2.5.4 Digital Accounting and Financial Management Transformation

Digital accounting can directly transform financial management by reducing manual processes, improving reporting timeliness, increasing information accuracy, and enabling more efficient financial monitoring. Payamta (2023) emphasizes the automation and digital storage benefits of digital accounting, while Kusumawardhani et al. (2024) provides empirical evidence regarding improvements in accounting information accuracy, timeliness, and cost efficiency. In addition, Andayani et al. (2026) shows that cloud accounting enhances efficiency, transparency, and reporting flexibility. These findings support the expectation that Digital Accounting directly contributes to Financial Management Transformation.

H4: Digital Accounting positively affects Financial Management Transformation.

2.5.5 Accounting Information Systems and Financial Management Transformation

AIS serves as the infrastructure that connects transaction data, accounting processes, internal controls, and financial reporting. The findings of Tenriwali et al. (2026) show that AIS contributes to business process efficiency, financial record accuracy, and decision-making, while Hayati et al. (2025) demonstrates its contribution to financial

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statement quality and organizational performance. Furthermore, Sari et al. (2025) identifies organizational and human-resource factors that determine AIS performance. These findings indicate that an effective AIS can facilitate the transition from fragmented and manual financial management toward integrated, timely, and information-based financial management.

H5: Accounting Information Systems positively affect Financial Management Transformation.

2.5.6 The Mediating Role of Accounting Information Systems in the Relationship between Data Analytics Capability and Financial Management Transformation

The proposed mediation relationship follows the logic that Data Analytics Capability provides the organizational capability to generate and interpret information, while AIS provides the infrastructure through which this capability can be embedded into financial management processes. From the RBV perspective, resources generate organizational value when they can be effectively exploited. From the Dynamic Capability perspective, analytical insights must be incorporated into organizational processes to produce transformation. Therefore, AIS is expected to transmit part of the effect of Data Analytics Capability to Financial Management Transformation.

The empirical findings of Pertiwi and Hana (2025) and Santoso et al. (2026) establish the importance of analytics for financial decision-making, while Tenriwali et al. (2026), Hayati et al. (2025), and Sari et al. (2025) establish the importance of AIS for financial information and organizational processes. Integrating these findings suggests a theoretically meaningful indirect pathway from Data Analytics Capability through AIS to Financial Management Transformation.

H6: Accounting Information Systems mediate the relationship between Data Analytics Capability and Financial Management Transformation.

2.5.7 The Mediating Role of Accounting Information Systems in the Relationship between Digital Accounting and Financial Management Transformation

Digital Accounting provides technological capabilities for automating and integrating financial activities, but its transformational benefits depend on whether those capabilities are incorporated into effective accounting information processes. The TOE framework indicates that technological adoption alone is insufficient when organizational systems and readiness do not support implementation. Findings from Andayani et al. (2026) and Putri et al. (2025) demonstrate the importance of organizational readiness, infrastructure, stakeholder pressure, and regulatory compliance in digital accounting adoption. Meanwhile, Tenriwali et al. (2026) and Hayati et al. (2025) demonstrate the contribution of AIS to efficiency and financial information quality. Consequently, AIS is expected to mediate the relationship between Digital Accounting and Financial Management Transformation.

H7: Accounting Information Systems mediate the relationship between Digital Accounting and Financial Management Transformation.

3. Research Methods

3.1 Research Design

This study employs a quantitative approach with a causal research design because it aims to test the cause-and-effect relationships between independent variables (data analytics capability and digital accounting), the mediating variable (accounting information systems), and the dependent variable (financial management transformation) (Sari et al., 2022). A quantitative approach was selected because it enables researchers to objectively measure and analyze relationships among variables using statistical techniques. Previous studies have demonstrated that quantitative survey methods are appropriate for examining relationships among variables in the MSME context (Hidayah, 2025).

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Furthermore, this study adopts an explanatory research design to explain the magnitude and direction of the relationships among variables formulated in the research hypotheses. The study uses a cross-sectional design in which data are collected at a single point in time to capture the current condition of the investigated variables.

The causal and explanatory orientation is reflected in the structural model, which examines both the direct effects of Data Analytics Capability and Digital Accounting on Financial Management Transformation and their indirect effects through Accounting Information Systems (AIS). The use of a cross-sectional survey is appropriate for testing the hypothesized relationships among these constructs based on respondents' current experience with digital financial management practices.

3.2 Research Context and Setting

The research was conducted in digital-based Food & Beverage (F&B) MSMEs operating in Medan City, Indonesia. Medan was selected because it is one of the largest economic centers in Sumatra with a rapidly growing MSME sector, particularly in food and beverage businesses. In recent years, many MSMEs in Medan have adopted digital technologies, including accounting information systems and digital accounting applications, creating an appropriate setting for investigating digital transformation in financial management practices.

The study focuses specifically on MSMEs that have implemented accounting information systems in their financial management processes, making them relevant for examining the interplay between data analytics capability, digital accounting, and financial management transformation.

The geographical scope of the study is limited to Medan City and does not extend to other cities or regencies in North Sumatra Province. Therefore, all population identification, sampling, inclusion criteria, questionnaire distribution, and interpretation of findings are consistently restricted to digital-based F&B MSMEs located in Medan City. This contextual delimitation is intended to ensure that the sampled organizations operate within comparable institutional and business environments.

3.3 Population and Sample / Research Participants

The population of this study consists of all digital-based Food & Beverage (F&B) MSMEs operating in Medan City. Based on data from the Medan City Cooperatives, Small and Medium Enterprises Office and publications from the Central Statistics Agency (BPS) of Medan City, the number of F&B MSMEs exceeds 50,000 business units.

The figure of more than 50,000 F&B MSMEs represents the broad target population and is not equivalent to the accessible population used for sampling. Because the present study requires respondents with direct experience in digital financial management and AIS, a screening process was applied to identify MSMEs meeting the specific inclusion criteria. The resulting accessible population consists of 120 eligible digital-based F&B MSMEs in Medan City that could be contacted and approached for participation in the study. Thus, the number 120 represents the accessible sampling frame rather than an estimate of all F&B MSMEs in Medan City.

The sampling technique employed is purposive sampling, which selects respondents based on specific criteria relevant to the research objectives.

Purposive sampling was selected because the research requires respondents who possess direct knowledge and practical experience regarding digital accounting, AIS, data analytics, and financial management. Accordingly, not every F&B MSME in the broad population is eligible to participate. The sampling unit is the eligible MSME, while the respondent is an individual within the MSME who is directly responsible for or involved in financial management and accounting information system activities.

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The inclusion criteria are:

a. MSMEs operating in Medan City, Indonesia, for at least three years;
b. Having a dedicated finance or accounting function or personnel responsible for financial and accounting activities;
c. Implementing a computer-based or digital accounting information system;
d. Having financial management personnel directly involved in operating the accounting system.

These criteria ensure consistency between the research setting, accessible population, and unit of analysis. MSMEs located outside Medan City or those that do not use a digital or computer-based accounting information system are excluded from the sampling frame.

The sample size was not determined using the Slovin formula because the study employs non-probability purposive sampling and SEM-PLS. Instead, sample adequacy is justified using an a priori statistical power approach. Given that the maximum number of predictors directed at an endogenous construct in the proposed structural model is two, a minimum sample size can be determined based on the statistical power required to detect a meaningful effect. Using a significance level of 5%, statistical power of 80%, and a medium anticipated effect size ($f^2 = 0.15$), the minimum required sample is 68 observations.

The accessible population of 120 eligible MSMEs therefore provided a sufficient sampling frame for achieving the required statistical power. All 120 eligible MSMEs were approached and invited to participate in the study. Accordingly, 120 questionnaires were distributed, of which 105 questionnaires were returned, representing a response rate of 87.5%.

Of the 105 returned questionnaires, 5 questionnaires were excluded because they did not meet the data-quality and eligibility requirements. Consequently, 100 questionnaires were retained as valid observations for the SEM-PLS analysis. Thus, the final sample consisted of 100 MSMEs, exceeding the minimum requirement of 68 observations.

The sampling process can therefore be summarized as follows: 120 eligible MSMEs constituted the accessible population and questionnaires distributed; 105 questionnaires were returned; 5 returned questionnaires were excluded; and 100 valid observations were retained for analysis. The response rate was calculated based on the 105 returned questionnaires relative to the 120 questionnaires distributed (105/120 × 100% = 87.5%).

The unit of analysis in this study is the MSME organization, whereas the individual respondent serves as the source of information representing the selected MSME. The respondents consist of individuals directly involved in financial management activities, including finance managers, accounting staff, treasurers, and accounting information system operators.

Because the constructs are measured through individual respondents' perceptions of organizational practices, the respondent must have sufficient knowledge of the MSME's financial management and digital accounting processes. Where more than one eligible individual is available within an MSME, only one respondent with the most direct responsibility for the accounting or financial management function will be selected to avoid duplicate organizational observations.

3.4 Data Sources and Data Collection

This study utilizes both primary and secondary data sources. Primary data are obtained directly from respondents through structured questionnaires distributed to selected MSME financial personnel. Primary data were chosen because they capture respondents' perceptions regarding data analytics capability, digital accounting, accounting information systems, and financial management transformation. This approach is consistent with previous studies investigating behavioral and perception-based variables in MSMEs.

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Secondary data are used to support the analysis and provide contextual understanding. These data include MSME profiles, reports from the Medan City Cooperatives and MSMEs Office, statistical publications from BPS Medan, and relevant academic literature related to digital transformation and accounting information systems.

Data collection was conducted through both offline and online survey methods. Offline surveys involved direct visits to MSMEs for questionnaire distribution, while online surveys were administered using Google Forms distributed via email and WhatsApp. Follow-up reminders were provided within two to three weeks after the initial distribution to improve response rates. Completed questionnaires were subsequently screened to ensure completeness and eligibility for analysis.

Before statistical analysis, the 105 returned questionnaires underwent a systematic screening procedure. Responses were checked for completeness, eligibility, duplicate submissions, and response patterns that may indicate careless or invalid responses. Following this screening process, 5 questionnaires were excluded, while 100 valid observations were retained for further SEM-PLS analysis.

3.5 Measurement of Variables and Research Instruments

This study involves four main constructs: Data Analytics Capability (independent variable), Digital Accounting (independent variable), Accounting Information Systems (mediating variable), and Financial Management Transformation (dependent variable).

The primary research instrument is a structured questionnaire consisting of closed-ended statements measured using a five-point Likert scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree). The use of a five-point Likert scale is considered appropriate because it balances response precision and ease of completion. The questionnaire is divided into five sections:

a. Respondent demographic information;
b. Data Analytics Capability (8 items);
c. Digital Accounting (10 items);
d. Accounting Information Systems (12 items covering system quality, information quality, service quality, and user satisfaction);
e. Financial Management Transformation (12 items).

In total, the questionnaire contains 42 measurement items and 6 demographic questions.

The measurement model is specified as a reflective measurement model because the observed indicators are treated as manifestations of their respective latent constructs. The measurement items are designed to capture the underlying dimensions of Data Analytics Capability, Digital Accounting, AIS, and Financial Management Transformation consistently across respondents.

3.6 Data Analysis Techniques

Data analysis will be performed using Structural Equation Modeling–Partial Least Squares (SEM-PLS) through SmartPLS version 4.0 or later. SEM-PLS was selected because:

a. The study aims to predict and explain relationships among variables;
b. The conceptual model incorporates a mediating variable;
c. SEM-PLS does not require strict normality assumptions;
d. The sample size is relatively limited and is determined based on statistical power rather than the Slovin formula;
e. The model involves multiple endogenous and exogenous constructs.

SEM-PLS has been extensively applied in studies related to MSMEs, digital transformation, and accounting information systems (Nugraha, 2020).

The analysis will be conducted in two stages. First, the measurement model will be evaluated to establish indicator reliability, convergent validity, internal consistency reliability, and discriminant validity. Second,

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the structural model will be assessed to examine the hypothesized relationships among the constructs. This two-stage procedure ensures that the structural relationships are interpreted only after the adequacy of the measurement model has been established.

For the structural model, collinearity will be assessed using the Variance Inflation Factor (VIF). The coefficient of determination (R^2) will be examined to assess the explanatory power of endogenous constructs, while effect size (f^2) will be used to evaluate the substantive contribution of each predictor. Predictive relevance will also be assessed using Q^2 where applicable. Bootstrapping with 5,000 resamples will be employed to determine the significance of direct and indirect effects and to obtain confidence intervals for the estimated relationships.

For mediation analysis, the indirect effects of Data Analytics Capability → AIS → Financial Management Transformation and Digital Accounting → AIS → Financial Management Transformation will be tested directly through bootstrapping. The mediation decision will be based on the significance and confidence interval of the indirect effect, while the direct effect will also be considered to determine whether the mediation is complementary, indirect-only, or not supported.

3.7 Validity, Reliability, and Trustworthiness

Prior to the main survey, a pilot study involving 30 respondents with characteristics similar to the target sample will be conducted. The pilot study aims to assess questionnaire clarity, item comprehensibility, and instrument quality.

The pilot study will primarily be used to evaluate the clarity, wording, comprehensibility, and practical suitability of the questionnaire before the main survey. The formal assessment of the measurement model in the main study will follow the SEM-PLS evaluation procedures rather than relying primarily on Pearson Product Moment correlation.

Within the SEM-PLS framework, indicator reliability will be assessed using outer loadings. Indicators with outer loadings of approximately 0.70 or higher will generally be considered acceptable, while lower-loading indicators will be evaluated based on their theoretical relevance and their contribution to construct reliability and validity. Convergent validity will be assessed using Average Variance Extracted (AVE), with an AVE value of at least 0.50 indicating that the construct explains more than half of the variance of its indicators.

Internal consistency reliability will be assessed using both Composite Reliability (CR) and Cronbach's Alpha, with values of approximately 0.70 or higher generally indicating acceptable reliability. Cronbach's Alpha will therefore be treated as a supplementary reliability measure rather than the sole basis for establishing construct reliability. Discriminant validity will be evaluated using the Heterotrait–Monotrait Ratio (HTMT) and the Fornell–Larcker criterion. HTMT will be prioritized as the principal assessment of discriminant validity, while the Fornell–Larcker criterion will provide additional evidence that each construct is empirically distinct from the others. The measurement model will consequently be considered adequate when the indicators demonstrate acceptable reliability, convergent validity, and discriminant validity. Any indicator removal will be based on statistical evidence and theoretical considerations rather than on statistical criteria alone.

3.8 Ethical Considerations

This study adheres to established research ethics principles. Participation is voluntary, and respondents are informed about the objectives and procedures of the study before completing the questionnaire. Informed consent is obtained from all participants. Respondents' identities and organizational information are kept confidential and used

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exclusively for academic purposes. Data collected are stored securely and analyzed in aggregate form to ensure anonymity and protect participants from potential risks associated with disclosure. Respondents are informed that participation or non-participation will not affect their business activities or relationship with any institution. No personally identifying information that is unnecessary for the research objectives will be reported in the manuscript.

3.9 Research Procedure

The research procedure consists of the following stages:

a. Conducting a literature review and developing the conceptual framework;
b. Designing and validating the research instrument;
c. Obtaining research permissions from relevant institutions;
d. Identifying MSMEs that meet the inclusion criteria and establishing the accessible sampling frame;
e. Conducting a pilot study;
f. Distributing questionnaires through offline and online channels;
g. Monitoring responses and conducting follow-up reminders;
h. Screening and cleaning the collected data;
i. Analyzing data using SEM-PLS;
j. Interpreting the findings and drawing conclusions.

Following data screening, 120 questionnaires had been distributed to eligible MSMEs, 105 questionnaires had been returned, 5 questionnaires had been excluded, and 100 valid observations had been retained for analysis. This reporting procedure provides transparency regarding the 87.5% response rate and ensures that the final sample can be reconciled with the accessible sampling frame and the minimum sample-size requirement. These stages ensure methodological consistency and facilitate replication in future studies.

3.10 Methodological Limitations

Several limitations should be acknowledged. First, the cross-sectional design captures perceptions at a single point in time and therefore limits causal inference over longer periods. Second, the study focuses exclusively on digital-based Food & Beverage MSMEs in Medan City, which may limit the generalizability of findings to other sectors or geographical regions.

Third, the use of self-reported questionnaire data may introduce respondent bias and common method bias. To minimize this issue, several preventive measures are implemented, including anonymity assurance, separation of independent and dependent variable items, randomization of question order, and statistical assessment through Harman's Single Factor Test.

In addition, because the study uses a single respondent from each participating MSME, the responses may reflect individual perceptions of organizational practices rather than objectively observed organizational conditions. This limitation is addressed by requiring respondents to have direct involvement in financial management and AIS operations.

Additionally, multicollinearity will be assessed using the Variance Inflation Factor (VIF), where acceptable values are below 5.0 and preferably below 3.3 in studies with higher common method bias risk. Common method bias will be assessed using both procedural and statistical approaches. Procedurally, anonymity, neutral wording, separation of construct items, and randomization of question order will be applied. Statistically, Harman's Single Factor Test will be used as a supplementary diagnostic rather than as the sole evidence for the absence of common method bias.

Normality assessment will not be treated as a prerequisite for SEM-PLS estimation because PLS-SEM does not require multivariate normality. Nevertheless, skewness and kurtosis will be examined descriptively to identify extreme non-normality and unusual

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response patterns.

4. Results and Discussion

4.1 Research Results

4.1.1 Sample Description and Descriptive Statistics

This study distributed questionnaires to 120 respondents who are financial managers, accounting staff, and information system operators in MSMEs in North Sumatra Province. Of these, 105 questionnaires returned (*response rate* 87.5%) and after going through the selection process and testing the completeness of the data, 100 questionnaires were obtained that were valid and worthy of analysis.

Based on demographic data, the characteristics of respondents are dominated by women (62%), with the highest age range between 31-40 years old (45%). The education level of the majority of respondents is Bachelor (S1) which is 68%, followed by Diploma (D3) at 22%. The most respondent positions were accounting staff/treasurer (52%), then the head of finance (28%). The average length of work of respondents in MSMEs was 5-10 years (48%), which indicates that respondents have adequate experience in assessing the implementation of accounting information systems in their workplaces. As many as 72% of respondents stated that they had participated in accounting or digital systems training in the last 3 years.

4.1.2 Data Quality and Preliminary Analysis

a. Evaluation of Measurement Models (*Outer Model*)

Before testing the hypothesis, an evaluation of the measurement model is carried out to ensure that the research instrument is valid and reliable. The evaluation includes convergent validity tests, discriminant validity, and reliability tests.

1) Convergent Validity Test

The validity of the convergence was tested by looking at the outer loading value of each indicator against its construct as well as the Average Variance Extracted (AVE) value. The results of data processing with SmartPLS 4.0 are shown in Table 1 below.

Table 1. Outer Loading and AVE Test Results

Variable	Indicator	Outer Loading	AVE	Remarks
Data Analytics Capability (X1)	X1.1 (Real-time data access)	0,852	0,689	Valid
	X1.2 (Descriptive analysis)	0,821		Valid
	X1.3 (Predictive analysis)	0,843		Valid
	X1.4 (Prescriptive analysis)	0,804		Valid
Digital Accounting (X2)	X2.1 (Recording automation)	0,876	0,704	Valid
	X2.2 (Accounting software)	0,853		Valid
	X2.3 (Data integration)	0,832		Valid
	X2.4 (Automatic reporting)	0,815		Valid
	X2.5 (Data security)	0,791		Valid
Accounting Information System (Z) Mediation	Z1 (System quality)	0,845	0,672	Valid
	Z2 (Quality of information)	0,836		Valid
	Z3 (Quality of service)	0,802		Valid
	Z4 (User satisfaction)	0,814		Valid
Financial Management Transformation (Y)	Y1 (Efficiency)	0,862	0,718	Valid
	Y2 (Report accuracy)	0,841		Valid
	Y3 (Transparency)	0,828		Valid
	Y4 (Internal control)	0,875		Valid
	Y5 (Quality of decisions)	0,853		Valid
	Y6 (Regulatory compliance)	0,794		Valid

Source: SmartPLS 4.0 output (data processed, 2026)

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Based on Table 1, all indicators have an *outer loading* value of > 0.70, which indicates that each indicator is able to explain its construct well. The AVE value for each variable is also above the required threshold of > 0.50. Thus, all variables are declared to meet the criteria of convergent validity.

2) Discriminating Validity Test

The validity of the discriminant was tested using the Fornell-Larcker Criterion method, which compares the square root of AVE with the correlation between constructs. The square root value of AVE in each variable must be greater than the correlation value between the other variables. The test results are presented in Table 2.

Table 2. Results of the Discriminant Validity Test (Fornell-Larcker Criterion)

Variable	X1	X2	Z	Y
X1 (Data Analytics Capability)	0,830			
X2 (Digital Accounting)	0,623	0,839		
Z (AIS)	0,589	0,642	0,820	
Y (Financial Transformation)	0,543	0,601	0,688	0,847

Source: SmartPLS 4.0 output (data processed, 2026)

Table 2 shows that the square root value of AVE for each variable (0.830; 0.839; 0.820; 0.847) is higher than the correlation between the variable and the other variables. This indicates that each construct has good discriminant validity, meaning that the constructs in this study are completely conceptually different.

As a reinforcement, the Heterotrait-Monotrait Ratio (HTMT) test was also carried out which is presented in Table 3. All HTMT values are below the threshold of 0.90, so that the criteria for discriminant validity are met.

Table 3. HTMT Test Results

Variable	X1	X2	Z
X2	0,742		
Z	0,701	0,765	
Y	0,647	0,715	0,819

Source: SmartPLS 4.0 output (data processed, 2026)

3) Reliability Test

The reliability test was carried out by looking at Cronbach's Alpha and Composite Reliability (CR) values. A construct is declared reliable if Cronbach's Alpha and CR values > 0.70. The test results are presented in Table 4.

Table 4. Reliability Test Results

Variable	Cronbach's Alpha	Composite Reliability	Remarks
X1 (Data Analytics Capability)	0,852	0,898	Reliable
X2 (Digital Accounting)	0,895	0,922	Reliable
Z (Accounting Information System)	0,843	0,891	Reliable
Y (Financial Management Transformation)	0,911	0,933	Reliable

Source: SmartPLS 4.0 output (data processed, 2026)

Cronbach's Alpha and Composite Reliability values were above 0.70, indicating that the research instrument had a high level of internal consistency and was reliable for use in subsequent analysis.

4.1.3 Main Analytical Results

After the measurement model is declared valid and reliable, the next step is to evaluate the structural model which includes the

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determination coefficient test (R^2), the measure effect test (f^2), and the predictive relevance test (Q^2). The results of the evaluation are presented in the following sub-chapters.

1) Coefficient of Determination Test (R^2)

The coefficient of determination (R^2) is used to measure how much independent and mediated variables are able to explain the dependent variables. The results of the R^2 test are presented in Table 5.

Table 5. Determination Coefficient (R^2) Test Results

Endogenous Variable	R Square	R Square Adjusted	Interpretation
Z (Accounting Information System)	0,524	0,514	Moderate
Y (Financial Management Transformation)	0,612	0,598	Moderate

Source: SmartPLS 4.0 output (data processed, 2026)

Based on Table 5, the R^2 value for the Accounting Information System (Z) variable is 0.524, which means that the Data Analytics Capability (X1) and Digital Accounting (X2) variables are simultaneously able to explain 52.4% of the variation in the Accounting Information System, while the rest (47.6%) is explained by other variables outside the research model. Meanwhile, the R^2 value for the Financial Management Transformation (Y) variable is 0.612, which means that the X1, X2, and Z variables are simultaneously able to explain 61.2% of the variation in the Financial Management Transformation. Based on the criteria of Hair et al. (2019), the R^2 values of 0.524 and 0.612 are included in the moderate category because they are in the range of 0.50 - 0.75.

2) Effect Test Size (f^2)

The effect *size* test (f^2) is used to measure the relative contribution of each independent variable to the dependent variable at the structural level. The interpretation of f^2 values follows Cohen's (1988) criteria: $f^2 \geq 0.02$ (small effect), $f^2 \geq 0.15$ (moderate effect), and $f^2 \geq 0.35$ (large effect). The test results are presented in Table 6.

Table 6. Effect Test Results Size (f^2)

Relationships	f^2	Interpretation
X1 → Z	0,186	Moderate Effects
X2 → Z	0,242	Moderate Effects
X1 → Y	0,042	Small Effects
X2 → Y	0,058	Small Effects
Z → Y	0,312	Medium Effect (Close to Large)

Source: SmartPLS 4.0 output (data processed, 2026)

Based on Table 6, the Digital Accounting variable (X2) has a moderate size effect on the Accounting Information System (f^2 = 0.242), followed by Data Analytics Capability (X1) which also has a moderate effect (f^2 = 0.186). Most interestingly, the Accounting Information System variable (Z) has a moderate to close size effect on Financial Management Transformation (f^2 = 0.312). This indicates that SIA's mediation role is very important in driving financial transformation.

3) Predictive Relevance Test (Q^2)

The *Q^2 Stone-Geisser* test was performed by *a blindfolding procedure* to measure the predictive relevance of the model. A value of $Q^2 > 0$ indicates that the model has *good predictive relevance*. The test results are presented in Table 7.

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Table 7. Predictive Relevance Test Results (Q^2)

Endogenous Variable	SSO	SSE	Q^2 (=1-SSE/SSO)
Z (Accounting Information System)	400,000	232,564	0,419
Y (Financial Management Transformation)	600,000	341,820	0,430

Source: SmartPLS 4.0 output (data processed, 2026)

The Q^2 value for the Accounting Information System variable is 0.419 (> 0) and for the Financial Management Transformation variable is 0.430 (> 0). Thus, the structural model in this study has good *predictive relevance*.

4.1.4 Hypothesis Testing Results

Hypothesis testing was carried out with *a bootstrapping* (resampling) procedure 5,000 times to calculate t-statistical values, p-values, and path coefficients. A hypothesis is stated to be supported if the t-statistical value > 1.96 (p-value < 0.05) at a significance level of 5%. The results of the direct influence hypothesis testing are presented in Table 8, while the indirect influence (mediation) test is presented in Table 9.

a. Testing the Direct Influence Hypothesis

Table 8. Direct Effects Hypothesis Test Results

Hypothesis	Relationships	Coefficient (β)	Std. Error	T-Statistics	p-value	Verdict
H1	X1 → Z	0,385	0,089	4,326	0,000	H1 Supported
H2	X2 → Z	0,478	0,082	5,829	0,000	H2 Supported
H3	X1 → Y	0,153	0,098	1,561	0,119	H3 Not Supported
H4	X2 → Y	0,185	0,104	1,779	0,075	H4 Not Supported
H5	Z → Y	0,542	0,092	5,891	0,000	H5 Supported

Source: SmartPLS 4.0 output (data processed, 2026)

The interpretation of Table 8 is as follows:

1) H1: Data Analytics Capability has a significant positive effect on Accounting Information Systems. The path coefficient value was 0.385 with a t-statistic of 4.326 > 1.96 and a p-value of 0.000 < 0.05. This shows that the higher the data analytics capability, the better the quality of the Accounting Information System implemented in MSMEs in North Sumatra Province.
2) H2: Digital Accounting has a significant positive effect on the Accounting Information System. The path coefficient value was 0.478 with a t-statistic of 5.829 > 1.96 and a p-value of 0.000 < 0.05. Digital accounting makes a greater contribution (β=0.478) than data analytics capability (β=0.385) to the Accounting Information System.
3) H3: Data Analytics Capability has a direct positive effect on Financial Management Transformation. The t-value of 1.561 < 1.96 and the p-value of 0.119 > 0.05, so this hypothesis is rejected. This means that data analytics capabilities do not directly affect the transformation of financial management without going through the Accounting Information System.
4) H4: Digital Accounting has a direct positive effect on Financial Management Transformation. The t-value of 1.779 < 1.96 and the p-value of 0.075 > 0.05, so this hypothesis is rejected. Similar to X1, digital accounting also does not have a significant direct influence on the transformation of financial management.
5) H5: Accounting Information System has a significant positive effect on Financial Management Transformation. The path coefficient value was 0.542 with a t-statistic of 5.891 > 1.96 and a p-value of 0.000 < 0.05. This shows that the better the Accounting Information System is implemented, the higher the level of financial management transformation in

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MSMEs in North Sumatra Province.

b. Indirect Influence Testing (Mediation)

To test the mediating role of the Accounting Information System (Z) in the relationship between X1 and X2 to Y, an indirect effects analysis was conducted. The results are presented in Table 9.

Table 9. Indirect Effects and Mediation Test Results

Hypothesis	Relationships	Coefficient (β)	Std. Error	T-Statistics	p-value	VAF	Types of Mediation
H6	X1 → Z → Y	0,208	0,064	3,250	0,001	57,6%	Partial Mediation
H7	X2 → Z → Y	0,259	0,067	3,866	0,000	58,3%	Partial Mediation

Source: SmartPLS 4.0 output (data processed, 2026)

Based on Table 9, the two indirect influences show a t-statistical value of > 1.96 and a p-value < 0.05, so H6 and H7 are supported.

The *Variance Accounted For* (VAF) value is used to determine the level of mediation. VAF is calculated by the formula: VAF = (Indirect effect) / (Indirect effect + Direct effect). VAF criteria: VAF > 80% (full mediation), 20% ≤ VAF ≤ 80% (partial mediation), VAF < 20% (no mediation).

1) H6: Accounting Information System mediates the influence of Data Analytics Capability on Financial Management Transformation. The VAF value is 57.6% which is in the range of 20% - 80%, so it can be concluded that the Accounting Information System plays a role as a partial mediation in the relationship between data analytics capability and financial management transformation.
2) H7: Accounting Information Systems mediate the influence of Digital Accounting on Financial Management Transformation. The VAF value is 58.3% which is also in the range of 20% - 80%, so that the Accounting Information System plays a role as a partial mediation in the relationship between digital accounting and financial management transformation.

These findings show that although data analytics capability and digital accounting do not have a direct effect on financial management transformation (H3 and H4 are rejected), the two variables still have a significant influence indirectly through the Accounting Information System. In other words, the Accounting Information System functions as a very important mediation variable (full mediation in the sense of indirect-only mediation) because the influence of X1 and X2 on Y is fully transmitted through Z.

4.1.5 Visual Presentation of Results

Tables 1–9 present the results of measurement model evaluation, structural model assessment, hypothesis testing, and mediation analysis. These tables provide a comprehensive overview of the empirical findings and facilitate interpretation of the relationships among Data Analytics Capability, Digital Accounting, Accounting Information Systems, and Financial Management Transformation in MSMEs.

4.2 Research Discussion

4.2.1 Interpretation of Key Findings

The first findings of this study show that data analytics capability has a positive and significant effect on the accounting information system in MSMEs in North Sumatra Province (β = 0.385, t = 4.326, p < 0.001). This indicates that the higher the ability of MSMEs in Medan City to process and analyze financial data, the higher the quality of the accounting information system applied.

These findings are in line with the management accounting competency framework issued by the Institute of Management Accountants, which places data

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analytics and insights as one of the core competency domains alongside digital transformation and innovation. In practice, data analytics capabilities allow MSMEs to not only accurately record financial transactions, but also dig into strategic insights from historical data for better financial planning and control.

Further, these findings are supported by research Koundal et al. (2025) who found that the implementation of accounting information systems in MSMEs had a positive impact on the success of non-financial decision-making and performance, as AIS provided important non-financial information about business organizations. In the context of MSMEs, data analytics capabilities allow accounting information systems to generate not only routine financial reports, but also analysis of revenue trends per service, cash flow projections, and identification of operational cost efficiency. In other words, data analytics capabilities serve as a catalyst that increases the value of information generated by SIA from just raw data to actionable insights. The results also confirm that system quality and information quality (as an important dimension of SIA) are largely determined by the extent to which data can be analyzed in depth and in real-time.

The second finding shows that digital accounting has a positive and significant influence on the accounting information system with a coefficient value greater than data analytics capability ($\beta = 0.478$, $t = 5.829$, $p < 0.001$). This means that the implementation of digital accounting—including record-keeping automation, the use of cloud-based accounting software, data integration, and automated reporting—contributes more dominantly to improving the quality of SIA than data analytics capabilities. These findings are in line with the definition of digital accounting as the use of electronic systems to manage financial data, workflows, reporting, document storage, and regulatory compliance digitally within the platform. In the context of MSMEs in North Sumatra, the adoption of digital accounting is a technical foundation that allows SIA to operate effectively.

Research by Andayani et al. (2026) about the adoption of cloud accounting in Indonesian MSMEs revealed that MSMEs adopt cloud accounting mainly to improve efficiency, transparency, real-time reporting, and operational flexibility. The results of this study strengthen these findings by showing that in the MSME sector, digital accounting not only improves technical efficiency but also directly improves the quality of the accounting information system as a whole. Good digital accounting ensures that financial data is recorded automatically, integrated between modules, and accessible in real-time by authorized users. The digitization of accounting significantly improves operational efficiency, including time management, reduction of human error, and simplification of financial reporting and decision-making processes. Thus, the higher the level of accounting digitization in an MSME, the more reliable and responsive the accounting information system it has.

The most significant finding in this study is that accounting information systems play a role as a mediating variable in the relationship between data analytics capability and digital accounting to financial management transformation. The results of the analysis showed that neither data analytics capability nor digital accounting had a significant direct influence on financial management transformation (H3 and H4 were rejected), but both had a significant indirect influence through accounting information systems with VAF values of 57.6% and 58.3% respectively (partial mediation category). Meanwhile, the direct influence of accounting information systems on financial management transformation was very strong ($\beta = 0.542$, $t = 5.891$, $p < 0.001$). These findings indicate that AIS functions as an important transmission mechanism through which data analytics capability and digital accounting can be translated into financial management transformation. Data analytics capability may

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provide MSMEs with the ability to identify patterns, generate insights, and support analysis, while digital accounting may provide the technological functionality for recording, integrating, and reporting financial information. AIS provides the organizational infrastructure through which these resources can be integrated into information flows and embedded in routine financial management practices. Therefore, the nonsignificant direct effects of data analytics capability and digital accounting should not be interpreted as evidence that financial management transformation can only occur through AIS. Rather, the findings suggest that the effects of these digital capabilities are more effectively realized when they are incorporated into a functioning accounting information system.

These findings are in line with research Anggadini et al. (2025) which proves that accounting reporting functions as an important mediator in improving the performance of MSMEs, where financial literacy does not have a direct effect on performance but is influential through accounting reporting. The same pattern was found in this study: data analytics capability and digital accounting do not show significant direct effects on financial management transformation, while their indirect effects through AIS are significant. This pattern suggests that the analytical capacity provided by data analytics and the technological functionality provided by digital accounting may require an organizational mechanism that converts these resources into structured financial information, routines, and managerial practices. AIS may provide this mechanism by integrating financial data, facilitating reporting, and supporting the use of information in budgeting, forecasting, cost control, and decision-making. These findings are also supported by a systematic literature review conducted by Tenriwali et al. (2026) which concluded that the use of accounting information systems has a significant effect on improving business process efficiency, accuracy of financial records, and accuracy of decision-making in MSMEs in Indonesia. Thus, SIA is not just a recording tool, but an important organizational infrastructure that can facilitate the conversion of digital resources into financial management practices and transformation outcomes.

An alternative explanation should also be considered. The absence of significant direct effects may reflect the organizational conditions under which digital capabilities are implemented rather than indicating that these capabilities have no transformational value by themselves. For example, MSMEs may possess analytical tools or digital accounting applications without having sufficiently integrated processes, user capabilities, data governance, or managerial routines to translate the available technological resources into broader changes in financial management. Differences in digital maturity, the extent of system integration, and the way managers use accounting information may therefore influence whether digital capabilities generate direct transformational effects. The significant indirect effects observed in this study are consistent with the possibility that AIS serves as an enabling infrastructure that connects technological resources with organizational routines. However, the cross-sectional nature of the findings means that this mechanism should be interpreted as an empirical pattern supported by the mediation results rather than as evidence that transformation is exclusively dependent on AIS.

4.2.2 Comparison with Previous Studies

The findings regarding data analytics capability are consistent with the management accounting competency framework developed by the Institute of Management Accountants, which recognizes data analytics as a core competency supporting digital transformation and organizational performance. The results are also supported by Koundal et al. (2025), who found that AIS implementation enhances organizational performance by providing valuable financial and non-financial information for decision-making. Similar to their findings, this study demonstrates that

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data analytics capability improves the quality and usefulness of information generated by AIS.

The positive influence of digital accounting on AIS aligns with the findings of Andayani et al. (2026), who reported that cloud accounting adoption among Indonesian MSMEs improves efficiency, transparency, operational flexibility, and reporting quality. The present study extends this evidence by demonstrating that digital accounting not only improves operational effectiveness but also strengthens the overall functionality and quality of AIS.

The mediating role of AIS is consistent with the findings of Anggadini et al. (2025), who reported that accounting reporting mediates the relationship between financial literacy and MSME performance. Similarly, the present study finds that data analytics capability and digital accounting influence financial management transformation indirectly through AIS. These results are further supported by the systematic literature review conducted by Tenriwali et al. (2026), which concluded that AIS significantly improves business process efficiency, financial reporting accuracy, and decision-making quality within Indonesian MSMEs. Taken together, the comparison with previous studies suggests that AIS can be understood not simply as a technological endpoint, but as an organizational mechanism that helps translate digital resources into usable information and financial management routines.

4.2.3 Theoretical Contributions

This study contributes to the literature on digital transformation and accounting information systems by providing empirical evidence that AIS acts as a strategic intermediary linking technological capabilities with organizational transformation outcomes. The findings extend the information systems and digital transformation literature by demonstrating that data analytics capability and digital accounting do not automatically generate financial management transformation. Instead, the findings indicate that their transformational effects are more strongly observed when these capabilities are integrated into an effective AIS, which can embed analytical outputs and digital accounting functionality into organizational information flows and financial management routines.

Moreover, the study reinforces the perspective that AIS is not merely a technological tool for transaction processing but a strategic organizational capability that facilitates information integration, decision-making, and transformation processes. This contribution enriches the understanding of how digital technologies create organizational value within MSMEs operating in emerging economies. The findings therefore provide a more nuanced theoretical explanation of digital transformation by emphasizing the interaction between technological resources and organizational infrastructure. Data analytics capability can generate analytical capacity, while digital accounting can provide technological functionality, but the extent to which these resources contribute to organizational transformation may depend on how effectively they are integrated into organizational systems and routines.

4.2.4 Practical and Policy Implications

The findings have several practical implications for MSME owners, managers, and policymakers. For practitioners, investments in data analytics training and digital accounting technologies should be accompanied by efforts to strengthen AIS quality and integration. Rather than assuming that the adoption of digital tools will automatically produce financial management transformation, MSMEs should ensure that analytical capabilities and digital accounting functions are connected to reliable information flows and established financial management routines. For managers, the results emphasize the importance of establishing integrated accounting systems capable of generating accurate, timely, and relevant financial information. Such systems

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can support budgeting, forecasting, cost control, and strategic decision-making. From a policy perspective, government agencies and MSME development institutions should prioritize programs that promote AIS adoption alongside digital accounting initiatives. Capacity-building programs focusing on data analytics skills and AIS utilization can accelerate digital transformation among MSMEs and enhance their long-term competitiveness.

4.2.5 Integration with the Research Gap

This study successfully addresses the research gap identified in previous literature regarding the limited understanding of how data analytics capability and digital accounting contribute to financial management transformation in MSMEs. While prior studies primarily examined the direct effects of technological adoption on organizational performance, limited attention has been given to the mediating role of AIS. The findings demonstrate that AIS represents an important mechanism through which digital capabilities can be translated into transformational outcomes, while also indicating that the observed mediation should not be interpreted as evidence that transformation can only occur through AIS. The results instead provide a more nuanced explanation in which data analytics capability, digital accounting functionality, and AIS infrastructure interact in translating technological resources into financial management practices within MSMEs.

4.2.6 Acknowledgement of Study Limitations

Despite its contributions, this study has several limitations. The findings are limited to digital-based Food & Beverage MSMEs in Medan City, which may restrict their generalizability to other sectors or geographical contexts. In addition, the interpretation of financial management transformation may vary across organizations depending on their level of digital maturity and organizational characteristics. Future studies are encouraged to examine different industry sectors, broader geographical regions, and additional organizational factors that may influence the relationship between technological capabilities, AIS effectiveness, and financial management transformation.

5. Conclusion

Based on the results of the analysis and discussion, it can be concluded that Data Analytics Capability and Digital Accounting have no direct effect on the Transformation of Financial Management in digital-based Food & Beverage MSMEs in Medan City. However, both have a significant influence on the Accounting Information Systems (AIS), and SIA has a strong influence on the transformation of financial management. Thus, SIA plays a very important role as a mediating mechanism through indirect-only mediation. This means that although data analytics and digital accounting do not have significant direct effects on financial management transformation, their significant indirect effects through a quality accounting information system (reliable, accurate, integrated) indicate that AIS provides an important mechanism through which these capabilities can be translated into financial management transformation. Therefore, the findings should not be interpreted as evidence that financial management transformation can only occur through AIS. Digital-based F&B MSMEs in Medan need to prioritize strengthening SIA and integrating it with analytics technology and digital accounting.

5.1 Summary of Key Findings

This study found that Data Analytics Capability and Digital Accounting each had a positive and significant effect on the Accounting Information Systems (AIS) in digital-based F&B MSMEs in Medan City, with a greater contribution of digital accounting (β=0.478) than data analytics capability (β=0.385). However, neither data analytics capability nor digital accounting have a direct effect on Financial Management Transformation. In contrast, SIA has a very

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strong direct influence on the transformation of financial management (β=0.542). Furthermore, SIA has been proven to play a role as a mediating variable through indirect-only mediation (with a VAF value of around 58%) in the relationship between data analytics capability and digital accounting to financial management transformation. Thus, the results indicate that the effects of data analytics capability and digital accounting on financial management transformation are transmitted indirectly through SIA, while their direct effects are not statistically significant. The success of financial transformation in MSMEs is therefore associated with the effective integration of accounting information systems with data analytics and digital accounting capabilities, rather than indicating that these capabilities can only be effective through SIA.

5.2 Theoretical Contributions

This research contributes to the theory of mediation in accounting information systems by proving that SIA plays a role as an indirect-only mediator: data analytics capability and digital accounting do not have significant direct effects on financial transformation, while their indirect effects through SIA are significant. These findings expand the DeLone & McLean IS Success Model by adding a technological antecedent to it. The research also integrates three separate literatures (data analytics, digital accounting, and SIA) into a comprehensive structural model, as well as validating the TOE framework in the context of MSMEs.

5.3 Practical and Policy Implications

Practical: Digital-based F&B MSME managers in Medan must prioritize strengthening the Accounting Information Systems (AIS) and ensuring its integration with data analytics technology and digital accounting. Reliable SIA (accurate, integrated, real-time) is an important organizational foundation for supporting financial transformation. Investing in digital accounting should therefore be accompanied by adequate AIS integration and organizational readiness to ensure that digital capabilities can be translated into effective financial management practices. Policy: The Medan City Cooperative and SME Office and F&B Association need to develop an integrated training program that includes three pillars: digital accounting, data analytics, and SIA optimization, not just focusing on one aspect of technology.

5.4 Limitations of the Study

This research has several limitations. First, cross-sectional design only captures relationships at a single point in time, so it cannot ensure long-term causality. Second, the use of perception data through questionnaires has the potential to cause common method bias. Third, the scope is limited to digital-based F&B MSMEs in one city (Medan), so generalization to other regions or sectors needs to be done carefully. Fourth, independent variables only include data analytics capability and digital accounting, while many other factors (e.g. top management support, regulation) are not studied.

5.5 Directions for Future Research

Future research is suggested using longitudinal designs to observe long-term causality. Mixed-methods research (questionnaire + in-depth interviews) can explore the context behind the mediation findings. Expanding coverage to other MSME sectors (fashion, handicrafts) or other cities in North Sumatra (trade, manufacturing) and between provinces will increase generalization. The addition of variables such as top management support, government regulation, and digital literacy as moderators or additional antecedents is highly recommended. Finally, the use of objective data (actual financial statements) can complement perception data to reduce common method bias.

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