Published by Yayasan Amerta Insan Unggul

DOI: 10.65246

p-ISSN 3063-9840 | e-ISSN 3063-8194

GoodWill Journal of Economics, Management, and Accounting

journal homepage: https://jurnal.amertainstitute.com/index.php/GoodWill/index



Development of a Value Chain-Based Digital Accounting Model to Enhance the Efficiency and Sustainability of the Jayapura–Wamena Fish Distribution Business

Kartini[1], Kartika[2]

[1]Universitas Sepuluh Nopember Papua, Indonesia

[2]Institut Teknologi Bisnis dan Administrasi Al Gazali Barru, Indonesia

Email: kartinisappe336@gmail.com; kartikasappe65@gmail.com

ARTICLE INFO

Keywords:
Improving Efficiency; Digital Accounting; Value Chain

Publication History:
Received: 11 April 2026
Screening: 25 April 2026
Review: 9 May 2026
Revision requested: 18 July 2026
Revised: 13 August 2026
Accepted: 27 October 2026

ABSTRACT

The evolution of digital technology has transformed accounting practices globally, including within the small business sector. In the cities of Jayapura and Wamena, the adoption of digital accounting is crucial for enhancing competitiveness, despite specific challenges. This study examines the impact of accounting digitalization on the efficiency of business operators in these cities. The research aims to uncover fundamental insights through deductive analysis and validate them with empirical evidence regarding the role of value-chain-based digital accounting in achieving business efficiency and sustainability. The study focuses on fish-related businesses in the Jayapura–Wamena region, employing a quantitative design that utilizes data collected from 16 business operators via questionnaires. It seeks to apply scientific knowledge and principles by verifying core concepts and the implementation of digital accounting within these fish businesses. This verification is conducted empirically in collaboration with the business operators. The findings reinforce the theoretical concepts under review and are expected to demonstrate that value-chain-based digital accounting positively influences efficiency. Consequently, the study proposes solutions to overcome challenges in improving efficiency and business sustainability, positing that the utilization of value-chain-based digital accounting as an input will yield increased efficiency and sustainable distribution operations as the output.

1. Introduction

Digital transformation has significantly reshaped economic activities, business management, financial administration, and interactions between business operators and consumers. The integration of digital technologies into business processes provides opportunities to improve operational efficiency, financial transparency, accountability, and sustainability. In accounting, digital systems enable business operators to record transactions systematically, access financial information more rapidly, monitor costs, and make decisions based on more accurate and timely data. The development of digital technologies, including cloud computing, artificial intelligence (AI), and blockchain, further expands the potential for integrating financial information with operational activities. Digital accounting is therefore increasingly relevant not only as a transaction-recording mechanism but also as a strategic instrument for improving business performance and supporting sustainable operations. Nevertheless, the benefits of digitalization depend on technological infrastructure, human-resource competencies, data security, and the capacity of business operators to integrate financial information into their decision-making processes. The importance of digital transformation in financial management is reflected in discussions of financial governance, efficiency, and transparency in the digital era (Alawiyah et al., 2025). In small and medium-sized enterprises (SMEs), the continued use of digital accounting systems is also an important consideration because the benefits of digitalization depend not only on initial adoption but also on users' willingness to maintain their use over time (Al-Hattami & Almaqtari, 2023).

In addition to financial administration, digital transformation creates opportunities to integrate

DOI: 10.65246

accounting information with value-chain analysis. A value chain encompasses the interconnected activities involved in procuring inputs, processing products, distributing goods, marketing, and delivering products to consumers. Integrating accounting data with these activities enables business operators to identify costs at each stage, evaluate operational efficiency, assess profitability, and recognize opportunities to improve resource allocation. Financial accounting information can also support sustainability assessments by linking economic activities with the resources consumed throughout production and distribution processes. The use of input-output analysis to manage sustainability through financial accounting data provides a conceptual foundation for connecting financial information with broader operational and sustainability considerations (Malik et al., 2021). Furthermore, the development of digital supply chains creates opportunities to strengthen the integration of accounting and operational information. Research on management accounting and blockchain technology highlights their potential relevance to supply-chain efficiency (Al-Zaqeba et al., 2022). A literature review of blockchain applications in accounting and supply-chain management likewise provides a basis for considering how digital technologies can support the management and exchange of information across interconnected business activities (Arwin et al., 2023). More recent work has examined the implementation of management accounting and blockchain in addressing digital supply-chain efficiency challenges (Indrijawati et al., 2026). However, the application of these approaches must be adapted to the characteristics of individual industries, particularly businesses operating under geographical and logistical constraints.

These issues are particularly relevant to fish distribution businesses between Jayapura and Wamena in Papua, Indonesia. The geographical conditions separating these locations create substantial logistical challenges because access to land transportation is limited and fish shipments rely heavily on air transportation. Consequently, transportation expenses constitute a significant component of distribution costs and influence working-capital requirements and selling prices. Business operators must also consider fish purchase prices, species and sizes, shipment quantities, delivery schedules, and the capacity to preserve product quality throughout distribution. These considerations are especially important because fish is a perishable product whose commercial value can decline when delivery is delayed or handling conditions are inadequate. Inaccurate estimates of shipment quantities, transportation expenses, or delivery times may increase operating costs, reduce profitability, and expose businesses to losses. These challenges underscore the importance of improving supply-chain coordination and operational efficiency through digital transformation. Evidence from companies listed on China's A-share market indicates that digital transformation is a relevant area of investigation in relation to supply-chain efficiency improvement (He et al., 2024), although its implications for small-scale fish distribution businesses operating under Papua's distinctive geographical conditions require context-specific examination.

The distribution context also reflects differences in resource availability and regional economic opportunities. Wamena, located in the highlands of Papua, depends on supplies transported from coastal areas, including Jayapura, to meet demand for marine fish. Despite the logistical challenges, fish distribution provides economic opportunities for local traders and supports the availability of fish products for consumers in inland areas. The continued development of digital communication has also changed the way traders interact with suppliers and customers. Mobile phones, WhatsApp, and other digital applications facilitate the exchange of information about product availability, orders, prices, and delivery arrangements, even when transactions and deliveries cannot be conducted directly. These developments create opportunities to improve coordination throughout the distribution chain. Nevertheless, access to communication applications alone does not guarantee effective business management. Business operators also require reliable financial records and an integrated approach to understanding how purchasing, transportation, inventory handling, and sales activities affect overall profitability. The adoption of digital technologies by micro and small businesses in Indonesia is therefore relevant to understanding the opportunities and challenges associated with digital transformation among smaller business operators (Trinugroho et al., 2022).

DOI: 10.65246

Digital accounting can address some of these operational challenges by providing a structured mechanism for recording purchase costs, transportation expenses, selling prices, sales revenue, and other relevant financial transactions. Accurate records can help traders estimate the capital required for each shipment, calculate profit margins, compare costs across distribution activities, and evaluate the financial consequences of alternative business decisions. For example, information about transportation costs and shipment quantities can support decisions regarding the volume of fish to distribute, while sales and cost records can assist in determining selling prices that reflect actual expenditure. Digitalization may also improve the availability and consistency of financial information, thereby reducing dependence on fragmented manual records. Research examining accounting digitalization and business performance provides a relevant basis for investigating these possibilities (Marjulin et al., 2025). Similarly, discussions of the development of accounting theory in the digital era emphasize the challenges and opportunities associated with adapting accounting practices to technological change (Rinjani & Haryadi, 2025). The potential of digital transformation in management accounting to support efficiency and competitive advantage further underscores the strategic relevance of integrating accounting information into business operations (Rosmala, 2024). In addition, the adoption of cloud accounting by micro, small, and medium-sized enterprises (MSMEs), including the role of digital vision and its relationship with economic sustainability, is relevant to assessing how digital accounting can support more sustainable business management (Wahyudi et al., 2024).

Beyond transaction recording and cost analysis, digital accounting can also contribute to the broader management of business sustainability. For fish distribution enterprises, sustainability involves not only maintaining profitability but also managing resources efficiently, minimizing avoidable losses, and ensuring that operational decisions support business continuity. Environmental accounting and waste management have been examined in relation to the sustainability performance of MSMEs, indicating the relevance of incorporating environmental considerations into business management (Latifah & Soewarno, 2023). In the context of fish distribution, these considerations are particularly pertinent because inadequate handling, shipment delays, and inaccurate demand estimates may lead to product deterioration and financial losses. Digital accounting that is connected to value-chain activities could help business operators identify the financial implications of these operational risks and assess opportunities to use resources more efficiently. The optimization of digital business operations to strengthen business sustainability in the digital era also provides a relevant perspective for considering the relationship between digital management practices and business continuity (Bakti et al., 2026).

Despite these opportunities, an important research problem remains concerning how digital accounting can be integrated systematically with value-chain activities in geographically constrained fish distribution businesses. Digital accounting adoption and business digitalization are often discussed in relation to general operational efficiency, financial administration, or technological innovation. However, the specific requirements of fish distribution between Jayapura and Wamena call for an approach that connects financial transaction records with the actual stages of distribution, including procurement, air transportation, product handling, sales, and profitability assessment. The perishable nature of fish, dependence on air transportation, and differences between coastal supply locations and inland consumer markets make cost visibility and timely decision-making particularly important. A digital accounting system that records transactions without mapping their relationships to value-chain activities may provide insufficient information for identifying cost inefficiencies and evaluating the sustainability of distribution operations. Consequently, the development of a value-chain-based digital accounting model represents a relevant research direction for connecting financial information, operational decisions, and business sustainability. The relationship between digital accounting technologies and efficiency in financial management is also relevant to research on the effects of digital accounting-based technologies on management efficiency (Yeye & Ibrahim, 2025).

Based on this problem, the central research question is how a value-chain-based digital accounting model can be developed to improve the efficiency and sustainability of fish distribution

DOI: 10.65246

businesses between Jayapura and Wamena. More specifically, the study seeks to identify the principal actors and activities in the fish distribution value chain, determine the financial information required at each stage, and formulate a digital accounting model that connects transaction recording with cost analysis, profitability assessment, and operational decision-making. The study also considers how the availability of integrated financial information can support decisions concerning shipment quantities, transportation expenditures, selling prices, and the management of distribution-related risks. These objectives address the need to understand how digital accounting can be adapted to the practical circumstances of small-scale distribution businesses and how its implementation can be aligned with the requirements of an integrated value chain.

Theoretically, this study is expected to contribute to the development of digital accounting by integrating value-chain analysis with financial information management in the context of perishable-product distribution and geographically constrained logistics. Rather than treating accounting solely as a mechanism for recording financial transactions, the proposed approach positions accounting information as an operational resource that connects costs, distribution activities, profitability, and sustainability considerations. Practically, the study is expected to provide a framework that fish distributors in Jayapura and Wamena can use to organize financial records, identify major cost components, estimate capital requirements, assess profit margins, and improve distribution-related decisions. The model may also offer a reference for other small-scale distribution businesses facing similar transportation, infrastructure, and product-quality challenges.

The novelty of this study lies in its context-specific integration of digital accounting and value-chain analysis for fish distribution between Jayapura and Wamena. By linking financial records with procurement, air transportation, product handling, and sales activities, the proposed model is intended to provide a more comprehensive basis for evaluating distribution efficiency and business sustainability. Accordingly, this study focuses not merely on the adoption of digital applications but on the development of an integrated accounting approach that reflects the operational realities of fish distribution in eastern Indonesia.

2. Literature Review

2.1. Conceptual and Theoretical Foundations

2.1.1. Business

Business refers to the ability of an enterprise to maintain its operations, growth, and economic value over the long term by adapting to changes in both the internal and external environment. This concept does not focus only on financial profit, but also includes the ability to maintain resource efficiency, build customer relationships, and adapt to technological changes and market dynamics. In the modern context, business sustainability is viewed as an important strategy for enabling organizations to survive increasingly complex and uncertain competition.

In the community context, business sustainability is an important element in supporting local economic resilience, particularly for microenterprises and community-based businesses. Entrepreneurs need to understand the difference between finance and accounting. Professional accountants can assist business owners as their businesses develop. As small businesses expand, it is highly recommended that they involve professional accountants experienced in small-business operations to guide them toward financial success. The characteristics of the fish distribution business also involve higher risks than businesses dealing with non-perishable goods. Fish is a product that requires proper handling and timely delivery to maintain its quality. Delays in delivery, errors in determining shipment quantities, or increases in transportation costs can affect business profitability. The geographical conditions between Jayapura and Wamena, which create dependence on air transportation, further strengthen the need for efficient business management. Therefore, business operators need the ability to estimate capital requirements, shipping costs, selling prices, and potential profits before carrying out distribution activities.

Financial management is an important aspect of business theory. Business operators need to know the amount of capital available, the costs incurred, the revenue generated, and the profit or loss resulting from business activities. Proper financial recording enables business operators to obtain a clearer picture of their business condition and provides a basis for decision-making. In the context of small businesses,

DOI: 10.65246

an understanding of basic accounting can provide a foundation for supporting long-term business success.

The development of digital technology subsequently provides opportunities for business operators to improve the quality of their business management. The use of digital technology enables transaction information, costs, revenues, and inventory to be recorded and managed more quickly and systematically. Digitalization can also help business operators obtain more timely information so that decisions regarding purchasing, shipping, selling prices, and capital utilization can be made based on more accurate information.

These professionals can find opportunities in accounting firms with diverse client bases, thereby gaining experience in handling various types of businesses. Entrepreneurs who master the basics of small-business accounting have laid a foundation for long-term success.

Sustainable businesses can increase income stability, create employment opportunities, and encourage economic growth at the local level. Therefore, strengthening community capacity through education, training, and mentoring is a relevant strategy to help business operators develop their businesses continuously. These efforts are increasingly important in the digital era, when technological change requires communities to manage businesses innovatively, efficiently, and adaptively in response to market needs.

2.1.2. Improving Efficiency

Financial readiness in the digital era is an important factor, considering the importance of transparency, accountability, and efficiency in managing public resources. Along with technological advances such as artificial intelligence (AI), blockchain, and cloud computing, public financial management processes can be optimized to improve efficiency and accuracy.

The development of human-resource skills, data security, and technological infrastructure readiness are important matters that must be considered. The state must ensure that finance professionals possess the knowledge and skills needed to manage and utilize digital technology effectively and efficiently. Policies and regulations concerning innovation are also needed to create a supportive environment for building contemporary financial systems.

This concept includes not only operational cost savings and faster transaction processes, but also reporting accuracy, the precision of financial decision-making, and the ability to adapt to changes in the business environment. Effectiveness concerns achieving desired results through optimal use of resources. Digital accounting adoption supports MSMEs in achieving these results by ensuring financial-data accuracy and improving performance metrics. The literature indicates that accounting digitalization improves both efficiency and effectiveness in MSME operations.

Financial-management efficiency in MSMEs can be defined as the ability of micro, small, and medium enterprises to use financial resources optimally to achieve maximum results with minimum cost and time. Research has found that competence in digital accounting significantly improves MSME performance and financial accountability. In this context, digitalization is not merely a technical tool, but also a managerial strategy that expands the adaptive capacity of small-business operators in facing complex and dynamic challenges.

The challenges and potential success of efficient MSME financial management also depend on openness to digital transformation and support from the technology ecosystem. Information and Communication Technology (ICT) plays a role in comprehensively transforming MSME accounting practices, from manual processes to automated and integrated systems. In a digital system, bank reconciliation, monitoring of receivables and payables, and preparation of income statements can be performed instantly and efficiently.

2.1.3. Value Chain

The supply chain is a strategic approach that integrates various elements such as suppliers, producers, and distributors with the aim of optimizing efficiency and competitiveness. This system includes planning, implementation, and control of material and information flows to meet consumer needs while minimizing costs. In the era of globalization, supply chains face various challenges, such as the complexity of logistics operations, lack of transparency that can trigger fraud, and problems with technology integration. Nevertheless, technologies such as Blockchain, IoT, AI, and predictive analytics enable improvements in

DOI: 10.65246

transparency, risk management, and responsiveness in the supply chain. Supply-chain digitalization represents an evolution from conventional systems toward technology-based platforms, with the aim of increasing company competitiveness through better information efficiency, reduced waiting times, and lower transaction costs.

Business operations are a series of activities carried out by an organization to manage resources, processes, and work systems in order to produce products or services that provide value to consumers. These activities include planning, organizing, implementing, and supervising all business processes so that they operate effectively and efficiently. By providing transparent and tamper-resistant transaction records, blockchain technology can address several critical problems in supply-chain management.

2.1.4. Digital Accounting

Historians of accounting view accounting as a social practice that influences human behavior as well as the functions and development of organizations and society. Accounting is deeply embedded in organizations and society. Accounting theory can also be defined from various paradigms, one of which is the perspective of quantitative researchers. From a quantitative perspective, accounting theory is defined as a collection of accounting constructs or concepts and propositions that systematically describe accounting-practice phenomena through analysis of relationships among variables.

Accounting is the process of recording, classifying, and summarizing financial transactions chronologically and systematically. The resulting financial statements are useful to parties who need them for decision-making. Revenue is income generated from normal business activities.

Accounting digitalization helps micro, small, and medium enterprises (MSMEs) reduce costs by automating manual processes, minimizing errors, and improving decision-making. MSMEs can adopt digital technology in management and accounting to improve performance and reduce costs. As major contributors to economic growth, job creation, and poverty reduction, particularly in developing countries, MSMEs benefit greatly from such efficiency. Interest in digitizing MSME accounting processes has increased because it promises greater efficiency and cost savings.

Digital-based accounting technology is the integration of software and information-technology-based systems designed to record, process, and report financial information automatically and in real time. This technology aims to improve efficiency, accuracy, and transparency in accounting processes, particularly in small and medium-sized businesses.

Digital transformation in accounting practices enables companies to simplify financial recording, reduce human error, and provide relevant information for strategic decision-making. Digital transformation in accounting systems strengthens financial-report transparency through more accurate and well-documented data-tracking mechanisms and facilitates monitoring of fraud or manipulation of financial statements. In this context, digital technology not only facilitates transaction recording but also strengthens companies' internal-control systems.

Factors affecting the successful adoption of digital accounting technology include digital literacy, availability of technological infrastructure, and government policy and regulatory support. Challenges in implementing digital accounting technology in MSMEs include limited understanding of the functions and benefits of such systems and dependence on manual record-keeping that has become habitual.

2.2. Review of Empirical Studies

The literature presented in the source material indicates several relevant themes concerning digital accounting, business efficiency, value-chain management, and business sustainability. These themes provide a conceptual basis for the present study, although the available material does not include sufficient bibliographic information or detailed empirical results to compare individual studies systematically.

First, the discussion of digital accounting emphasizes its potential to improve the efficiency and accuracy of financial management. Automated transaction recording, financial-data processing, and reporting can reduce repetitive administrative activities and minimize recording errors. For MSMEs, these capabilities are particularly relevant because limited financial-management resources may constrain their ability to maintain comprehensive records and make timely decisions. However, the

DOI: 10.65246

benefits of digital accounting depend on the availability of appropriate technology, adequate digital literacy, and the willingness of business operators to move beyond manual recording practices.

Second, the literature on business efficiency highlights the importance of using financial resources optimally while minimizing unnecessary costs and time. Digital financial information can support expenditure monitoring, revenue analysis, and the evaluation of business performance. Nevertheless, improvements in accounting administration do not necessarily guarantee improvements across all operational activities. Financial information becomes more useful when it is connected to the processes that generate the costs and revenues being recorded.

Third, the literature on value-chain and supply-chain management emphasizes the importance of coordinating product flows and information flows among business participants. Digital technologies can facilitate information exchange, improve transparency, reduce waiting time, and strengthen operational responsiveness. However, the benefits of digital supply-chain systems may be constrained by logistical complexity, limited infrastructure, and difficulties integrating different business processes. These challenges are particularly relevant to distribution activities involving geographically separated locations and products requiring timely delivery.

Fourth, the discussion of business sustainability indicates that long-term business continuity depends on financial management, resource efficiency, adaptability, and the ability to respond to changing market conditions. For fish distributors, sustainability is also influenced by product perishability, transportation costs, delivery reliability, and the capacity to maintain adequate working capital. Financial records that are not connected to operational activities may provide an incomplete picture of the factors affecting business continuity.

Taken together, these themes suggest that digital accounting, value-chain management, and business efficiency should not be examined exclusively as separate concepts. Their integration may provide a more comprehensive basis for evaluating the operational and financial conditions that influence business sustainability. The present study applies this perspective to fish distribution between Jayapura and Wamena, where geographical constraints and dependence on air transportation create specific requirements for financial information and distribution management.

2.3. Identification of the Research Gap

The research gap identified in this study concerns the limited contextual integration of digital accounting and value-chain analysis in the management of fish distribution businesses operating under geographical and logistical constraints. The source material discusses digital accounting as a means of improving financial-recording accuracy, transparency, cost control, and decision-making. It also explains the role of value-chain and supply-chain management in coordinating distribution activities and improving operational efficiency. However, these discussions do not yet establish a specific integrated model that connects financial records with the individual stages of fish distribution between Jayapura and Wamena.

Three related gaps can be identified.

First, a conceptual integration gap exists between digital accounting and value-chain management. Financial records can provide information about expenditure and revenue, while value-chain analysis can identify the activities that generate those financial outcomes. Nevertheless, a model is needed to connect these two perspectives systematically so that accounting information can support decisions at each stage of distribution.

Second, a contextual gap concerns the characteristics of fish distribution between Jayapura and Wamena. Dependence on air transportation, the perishability of fish, and the need to coordinate shipment quantities, delivery schedules, and selling prices create operational conditions that may differ from those of businesses distributing non-perishable products or operating in areas with more accessible land transportation. These characteristics require an approach that reflects the actual cost structure and logistical requirements of the distribution process.

Third, an application gap concerns the use of digital accounting information for operational decisions and long-term business sustainability. Recording financial transactions is important, but business operators also need to understand how procurement, transportation, handling, and sales activities affect total costs, profitability, and business

DOI: 10.65246

continuity. An integrated framework can help connect these activities and provide a more systematic basis for evaluating efficiency and sustainability.

To address these gaps, the present study focuses on developing a value-chain-based digital accounting model for fish distribution between Jayapura and Wamena. The model is intended to connect transaction recording with the mapping of distribution activities, cost analysis, profitability assessment, and operational decision-making. Its contribution lies in adapting digital accounting and value-chain concepts to the specific requirements of fish distribution in eastern Indonesia. These gaps are derived from the conceptual material provided; confirmation of the extent to which previous empirical studies have addressed them requires a verified review of the underlying journal articles.

2.4. Development of the Conceptual Framework

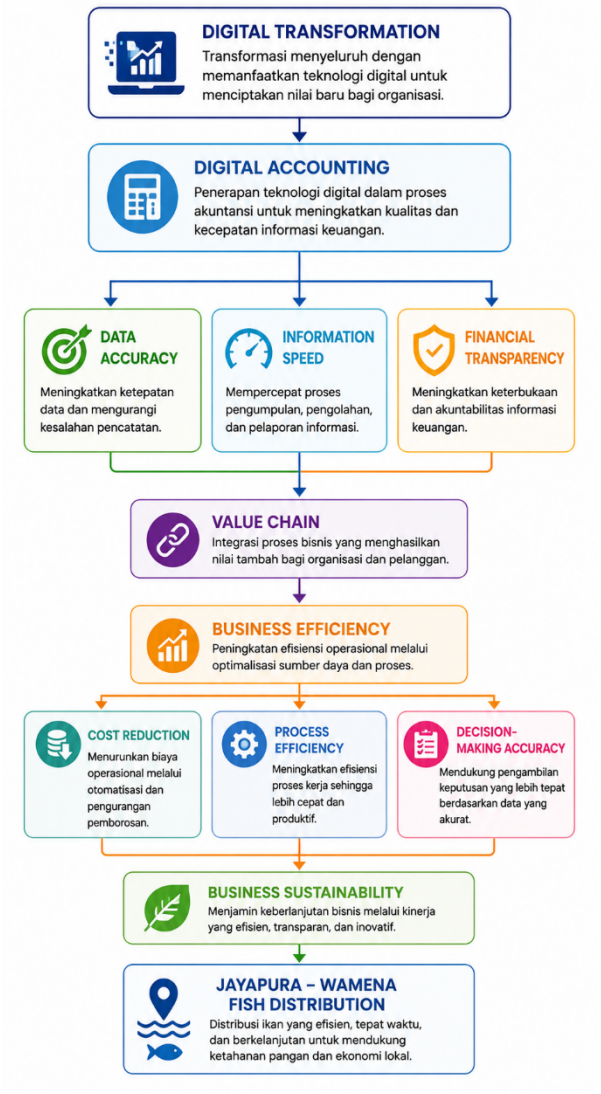


Fig. 1. Conceptual Framework

Relationships Among Variables

X = Digital Accounting

Digital accounting involves the use of software and information-technology-based systems to record, process, and report financial information automatically and in real time. In the article, digitalization is associated with improvements in efficiency, accuracy, transparency, and decision-making.

X = Value Chain

The value chain approach integrates suppliers, producers, distributors, and the flow of materials and information. Value-chain digitalization is intended to improve information efficiency, reduce waiting time, and lower transaction costs.

Y = Business Efficiency

Business efficiency refers to the ability of business operators to use resources optimally while minimizing costs and time. The article indicates that accounting digitalization has a positive relationship with efficiency and cost reduction.

Business Sustainability

Business sustainability represents the ability of a business to maintain its operations, growth, and economic value over the long term.

Conceptual Relationships

a. Digital Accounting → Business Efficiency
b. Digital Accounting → Value Chain
c. Value Chain → Business Efficiency
d. Business Efficiency → Business Sustainability
e. Digital Accounting → Business Sustainability
f. Value-Chain-Based Digital Accounting → Efficiency and Sustainability of Jayapura–Wamena Fish Distribution

Overall, the framework is consistent with the objective of the study, which is to demonstrate that value-chain-based digital accounting can serve as an input for improving efficiency and sustainability in fish distribution operations.

2.5. Hypotheses or Research Propositions

Based on the research material provided, the study is oriented toward developing a value-chain-based digital accounting model for fish distribution between Jayapura and Wamena. The material does not specify a quantitative hypothesis-testing design, measurable statistical relationships, or an empirical procedure for testing causal effects. Therefore, the study does not use statistical hypotheses in its current formulation.

DOI: 10.65246

Instead, the conceptual framework serves as a guide for identifying the relevant distribution activities, determining the financial information required at each stage, and formulating an integrated digital accounting model. The proposed relationships among digital accounting, value-chain management, business efficiency, and business sustainability function as conceptual directions for model development rather than statistically testable hypotheses.

If the research is subsequently designed as a qualitative model-development study, these relationships may be expressed as research propositions or guiding questions. However, such propositions should only be formulated when they are consistent with the final research design, data-collection procedures, and analytical approach. For the current formulation, no formal hypotheses are proposed.

3. Research Method

3.1. Research Design

This study employs a mixed-method research design combining quantitative and qualitative approaches to examine the role of digital accounting in improving the efficiency and sustainability of fish distribution businesses between Jayapura and Wamena, Indonesia. Quantitative data are obtained from closed-ended questionnaires and financial records, while qualitative data are collected through in-depth interviews with business operators who use information-system applications. The integration of these data sources is intended to provide a comprehensive understanding of financial-management practices, distribution-related challenges, and the development of a value-chain-based digital accounting model.

3.2. Research Context and Setting

The study focuses on fish distribution businesses operating between Jayapura City and Wamena, Papua, Indonesia. This setting was selected because limited land-transportation access makes air transportation an important component of fish distribution, resulting in substantial transportation expenses and specific challenges related to shipment quantities, delivery schedules, product quality, and working-capital requirements. The research involves business operators associated with the distribution network, including operators at Hamadi Fish Market in Jayapura and fish recipients in Wamena, providing a relevant context for examining the integration of financial information and value-chain activities.

3.3. Population and Sample / Research Participants

The research participants comprise fish-business operators involved in distribution activities between Jayapura and Wamena. The study uses purposive sampling, a non-probability sampling technique in which participants are selected based on their relevance to the research objectives and their experience in fish distribution and digital business applications. The reported sample consists of 16 business operators who provide questionnaire responses and relevant financial information. In-depth interviews are also conducted with business operators who use information-system applications. However, the available research documentation does not clearly establish whether all 16 participants participated in both the survey and the interviews.

3.4. Data Sources and Data Collection

This study uses primary and secondary data. Primary data are collected directly from participants through closed-ended questionnaires and in-depth interviews, which explore digital accounting practices, financial management, and distribution-related decision-making. Secondary data consist of numerical information obtained from financial statements and relevant business records, including information related to purchasing costs, transportation expenses, sales revenue, and other distribution expenditures. The combination of these sources is intended to provide complementary information on financial performance and operational practices. The specific data-collection period and detailed administration procedures are not reported in the available research material.

3.5. Measurement of Variables and Research Instruments

The study focuses on four main concepts: digital accounting, value-chain management, business efficiency, and business sustainability. Digital accounting refers to the use of digital applications to record and process financial transactions, while value-chain management concerns the coordination of procurement, transportation, product handling, and sales activities.

DOI: 10.65246

Business efficiency refers to the optimal use of financial and operational resources through cost control, effective capital utilization, and timely decision-making. Business sustainability represents the ability to maintain business operations and economic viability over the long term. Closed-ended questionnaires are used to obtain structured responses, interviews provide contextual information, and financial records support the examination of distribution costs and revenue. The available documentation does not specify the individual questionnaire items, measurement scales, or sources of previously validated instruments.

3.6. Data Analysis Techniques

Quantitative data from questionnaires and financial records are intended to describe financial-management practices, distribution costs, revenue, and business-efficiency conditions. Qualitative interview data are examined to understand how business operators use digital applications, coordinate distribution activities, and make financial decisions. The findings from both components are considered together to identify opportunities for integrating financial records with procurement, transportation, product handling, and sales activities. This integration provides the basis for developing a value-chain-based digital accounting model. However, the specific statistical tests, qualitative coding procedures, software, and formal mixed-method integration techniques are not identified in the available documentation and should be reported according to the analyses actually performed.

3.7. Validity, Reliability, and Trustworthiness

Research quality depends on the adequacy of the questionnaire, the consistency of financial records, and the credibility of interview information. Quantitative instrument assessment should establish whether the questionnaire appropriately measures the concepts under investigation and produces consistent results. Financial records should be examined for completeness and consistency, while qualitative findings should accurately reflect participants' experiences. Comparing questionnaire responses, interview accounts, and financial records may strengthen the credibility of the interpretation when such procedures are implemented. Nevertheless, the available research material does not report specific validity coefficients, reliability statistics, pilot-testing results, or formal trustworthiness procedures.

3.8. Ethical Considerations

The study involves business operators and potentially confidential financial information; therefore, participants' privacy and commercial interests must be protected. Participants should be informed about the research objectives, the nature of their involvement, and the intended use of the collected data, with participation based on informed consent. Questionnaire responses, interview information, and financial records should be handled confidentially and used for the stated research purposes. The available documentation does not specify whether formal ethical approval was obtained or detail the consent and data-protection procedures implemented; these matters should be reported according to the actual research arrangements.

3.9. Research Procedure

The research procedure comprises seven stages: (1) defining the research problem and objectives concerning digital accounting, value-chain management, business efficiency, and business sustainability; (2) selecting relevant fish-business operators through purposive sampling; (3) collecting questionnaire responses and financial information; (4) conducting interviews with business operators who use information-system applications; (5) analyzing quantitative and qualitative data according to the procedures actually employed; (6) integrating the findings to develop a value-chain-based digital accounting model linking financial records with procurement, transportation, product handling, sales, and profitability assessment; and (7) interpreting and reporting the findings in relation to the research objectives. The exact sequencing of the quantitative and qualitative components and any separate model-validation procedure should be clarified if applicable.

3.10. Methodological Limitations

This study has several methodological limitations. First, the sample comprises 16 purposively selected business operators, limiting the generalizability of the findings to the wider population of fish-distribution businesses. Second, the research focuses on the specific geographical and logistical conditions of Jayapura and Wamena, which

DOI: 10.65246

may differ from those of other distribution contexts. Third, the quality of the analysis depends on the completeness of financial records and the accuracy of questionnaire and interview responses. Fourth, the available documentation does not fully specify the procedures used to integrate quantitative and qualitative findings. Finally, the development of a value-chain-based digital accounting model does not, by itself, establish a causal effect on business efficiency or sustainability; such conclusions require appropriate empirical testing and clearly defined measurement indicators.

4. Research Results and Discussion

4.1. Research Results

4.1.1. Sample Description and Descriptive Statistics

The study involved 16 fish shippers and recipients operating within the Jayapura–Wamena distribution network, including business operators at Hamadi Fish Market in Jayapura City and fish recipients in Wamena. The participants provided information about digital accounting practices, financial management, and fish distribution activities. The research findings indicate that business operators use digital communication applications, particularly WhatsApp, to view fish types and sizes virtually before making distribution-related decisions. However, the available data do not provide detailed demographic or organizational profiles, frequencies, percentages, means, or standard deviations.

4.1.2. Data Quality and Preliminary Analysis

The study reports improvements in the accuracy and timeliness of financial information following the use of digital accounting applications. These applications facilitate the processing and review of financial information, including calculations of air-freight expenses and daily capital requirements. Nevertheless, the research material does not report formal preliminary tests of data quality, normality, multicollinearity, instrument reliability, or model fit. Therefore, the reported improvements should be interpreted as findings described in the source rather than as results of independently documented diagnostic tests.

4.1.3. Main Analytical Results

The findings indicate that digital accounting supports the efficiency of fish distribution businesses between Jayapura and Wamena by reducing recording errors and improving the accessibility, accuracy, and timeliness of financial information. Digital financial applications enable business operators to review transportation costs, estimate daily capital requirements, and consider shipment expenses when determining distribution arrangements. The reported findings also suggest a positive relationship between digitalization and business efficiency, with business size and technological readiness identified as relevant contextual factors. Smaller businesses with greater technological readiness are described as obtaining substantial benefits from digital accounting. However, the available material does not provide statistical coefficients, test statistics, confidence intervals, or detailed analytical outputs to quantify these relationships.

4.1.4. Hypothesis Testing Results / Key Findings

The principal findings are that (1) digital accounting improves access to financial information and supports more accurate and timely financial recording; (2) digital financial applications assist fish shippers and recipients in estimating capital requirements and evaluating air-transportation expenses; (3) digital communication facilitates the exchange of information concerning fish types and sizes between business operators in Jayapura and Wamena; and (4) technological readiness and business size are identified as relevant factors in the benefits obtained from digitalization. The source also reports a positive and significant relationship between digital accounting and business efficiency, as well as a potential efficiency improvement of 40–50% associated with digital technology. However, the statistical evidence supporting the significance claim and the calculation underlying the 40–50% figure are not provided. Accordingly, these statements cannot be independently verified from the reported results. The study does not present formal hypothesis-testing results with specified hypotheses, test statistics, or p-values.

4.2. Research Discussion

4.2.1. Interpretation of Key Findings

The findings suggest that digital accounting can support more efficient fish distribution by improving the availability of financial information and facilitating the calculation of transportation

DOI: 10.65246

expenses and capital requirements. In the Jayapura–Wamena distribution context, where air transportation represents an important operating expense, timely financial information can help business operators assess the financial implications of shipment decisions and determine appropriate distribution arrangements. The use of WhatsApp also facilitates communication between shippers and recipients concerning fish types and sizes. These practices demonstrate the complementary roles of digital communication and financial information management in supporting distribution activities. However, the available results do not establish the magnitude of the effects through reported statistical estimates, and the findings should therefore be interpreted as evidence of the potential contribution of digital accounting rather than definitive proof of causal effects.

4.1.1. Comparison with Previous Studies

The research findings are consistent with the general proposition presented in the study that digital accounting can improve financial-information accuracy, facilitate cost monitoring, and support business efficiency. The reported importance of technological readiness also suggests that the benefits of digitalization depend partly on business operators' ability to use digital applications effectively. Furthermore, the integration of accounting information with value-chain activities provides a relevant approach to understanding how procurement, transportation, and sales contribute to distribution costs. Nevertheless, the research material does not provide detailed empirical findings from previous studies or corresponding in-text citations in the results and discussion sections. Consequently, a critical comparison of specific studies, including similarities, differences, and methodological distinctions, cannot be established without introducing unsupported information.

4.1.1. Theoretical Contributions

The study contributes conceptually by emphasizing the integration of digital accounting and value-chain analysis in the context of fish distribution between Jayapura and Wamena. Digital accounting provides information about financial transactions and transportation expenses, while value-chain analysis connects this information with procurement, shipment, handling, and sales activities. Their integration offers a basis for understanding how financial information can support operational decision-making and resource allocation. The findings also highlight the relevance of technological readiness in the application of digital accounting among small-business operators. The theoretical contribution lies in applying these concepts to a geographically constrained distribution context rather than establishing a new theory or statistically validating a causal model.

4.1.1. Practical and Policy Implications

The findings indicate that fish-distribution businesses can benefit from maintaining systematic digital financial records covering fish purchases, air-freight expenses, shipment quantities, selling prices, and sales revenue. Integrating these records with distribution activities can help business operators estimate working-capital requirements, evaluate costs, and make more informed decisions about shipment arrangements. Business operators may also benefit from training in digital accounting applications, financial-record management, and the interpretation of cost information. For organizations supporting small businesses, training and mentoring initiatives could focus on digital literacy and practical financial management. Any policy initiatives should account for differences in technological readiness and access to infrastructure. These recommendations represent practical implications of the reported findings; their effectiveness would require further evaluation.

4.1.1. Integration with the Research Gap

The findings address the research gap concerning the integration of digital accounting with value-chain activities in fish distribution between Jayapura and Wamena. The use of digital applications to review financial information and estimate transportation expenses illustrates how accounting data can inform decisions at different stages of distribution. The role of WhatsApp in facilitating communication about fish types and sizes further demonstrates the importance of connecting information flows with distribution activities. These observations support the rationale for developing a value-chain-based digital accounting model that links financial records with procurement, transportation, product handling, and sales. Nevertheless, the study material does not demonstrate that a fully developed

DOI: 10.65246

and independently validated model has already been implemented. The contribution is therefore best understood as an empirical and conceptual basis for model development.

4.2.6. Acknowledgement of Study Limitations

The findings should be interpreted in light of the study's focus on 16 fish shippers and recipients in a specific distribution network. The available results do not provide detailed descriptive statistics, statistical test outputs, or sufficient information to establish the magnitude and significance of the reported relationships independently. The basis for the stated 40–50% efficiency improvement is also not documented in the supplied material. Furthermore, the study does not clearly distinguish the contributions of digital accounting from those of digital communication or other contextual factors. These limitations restrict the strength of causal conclusions and the generalizability of the findings to other businesses and geographical settings.

5. Conclusion

5.1. Summary of Key Findings

This study examines the role of digital accounting in improving the efficiency and sustainability of fish distribution businesses between Jayapura and Wamena. The findings indicate that digital financial applications facilitate access to financial information, improve the accuracy and timeliness of financial recording, and support the estimation of transportation expenses and daily capital requirements. WhatsApp also facilitates communication between fish shippers and recipients regarding fish types and sizes. These findings suggest that integrating financial information with distribution activities can support more informed operational decisions. However, the available evidence does not include sufficient statistical outputs to independently verify the magnitude or significance of the reported relationships.

5.2. Theoretical Contributions

The study contributes to the conceptual understanding of digital accounting by connecting financial-information management with value-chain activities in a geographically constrained fish-distribution context. It emphasizes that accounting can serve not only as a transaction-recording mechanism but also as a source of information for evaluating distribution costs, estimating capital requirements, and supporting operational decisions. The study also highlights technological readiness as a relevant consideration in digital accounting adoption. Its principal contribution is the contextual application of digital accounting and value-chain concepts to fish distribution between Jayapura and Wamena.

5.3. Practical and Policy Implications

Fish-distribution operators should be encouraged to use digital accounting applications to maintain systematic records of purchasing costs, transportation expenses, shipment quantities, selling prices, and sales revenue. These records can support capital planning, cost monitoring, and the evaluation of distribution decisions. Training in digital literacy and basic financial management may help small-business operators use digital applications more effectively. Business-support institutions and relevant policymakers may also consider initiatives that improve access to digital infrastructure and practical accounting education, particularly for businesses operating under logistical constraints.

5.4. Limitations of the Study

The study is limited by its focus on 16 fish shippers and recipients within the Jayapura–Wamena distribution network. The findings may not be directly generalizable to other distribution businesses or geographical settings. In addition, the absence of detailed statistical outputs and documented measurement procedures limits the extent to which the reported relationships can be independently assessed. The reported efficiency improvement of 40–50% also requires further clarification and empirical verification. Accordingly, the findings should be interpreted as context-specific evidence concerning the potential contribution of digital accounting rather than definitive proof of causal effects.

5.5. Directions for Future Research

Future research should involve a larger and more diverse sample of fish-distribution businesses to examine whether the findings apply across different operational and geographical settings. Researchers should also specify and report the indicators used to measure digital accounting adoption, business efficiency, and business

DOI: 10.65246

sustainability, together with the statistical procedures applied. Further studies could evaluate the proposed value-chain-based digital accounting model by examining its implementation across procurement, transportation, product handling, and sales activities. Longitudinal research or comparative assessments before and after implementation could help determine whether digital accounting produces measurable improvements in operating costs, financial-information accuracy, capital utilization, and business continuity. Future studies should also examine technological readiness and digital literacy as contextual factors that may influence the effectiveness of digital accounting adoption.

6. References

Alawiyah, K., Matondang, C., Panjaitan, T., & Haggata, F. (2025). Analisis transformasi digital dalam pengelolaan keuangan negara untuk meningkatkan efisiensi dan transparansi. *3*(1), 431–435.

Al-Hattami, H. M., & Almaqtari, F. A. (2023). What determines digital accounting systems' continuance intention? An empirical investigation in SMEs. *Humanities and Social Sciences Communications, 10*, Article 814. https://doi.org/10.1057/s41599-023-02332-3

Al-Zaqeba, M., Jarah, B., Ineizeh, N., Almatarneh, Z., & Jarrah, M. (2022). The effect of management accounting and blockchain technology characteristics on supply chains efficiency. *Uncertain Supply Chain Management, 10*(3), 973–982. https://doi.org/10.5267/j.uscm.2022.2.016

Arwin, M., Aulia, D., & Uzliawati, L. (2023). Implementasi blockchain dalam bidang akuntansi dan supply chain management: Studi literatur. *Progress: Jurnal Pendidikan, Akuntansi dan Keuangan, 6*(2), 76–90. https://doi.org/10.47080/progress.v6i2.2616

Bakti, Universitas, & Tunas Husada. (2026). Optimalisasi pengelolaan operasi bisnis digital untuk memperkuat keberlanjutan usaha di era digital. *3*(2).

He, J., Fan, M., & Fan, Y. (2024). Digital transformation and supply chain efficiency improvement: An empirical study from A-share listed companies in China. *PLOS ONE, 19*(4), Article e0302133. https://doi.org/10.1371/journal.pone.0302133

Indrijawati, A., Mediaty, Febriyanti, E. D., Pratiwi, N., & Hediyati, S. N. (2026). Digital supply chain transformation: Implementing management accounting and blockchain to address efficiency challenges. *Transekonomika: Akuntansi, Bisnis dan Keuangan, 5*(6), 1166–1179. https://doi.org/10.55047/transekonomika.v5i6.1092

Latifah, S. W., & Soewarno, N. (2023). The environmental accounting strategy and waste management to achieve MSME's sustainability performance. *Cogent Business & Management, 10*(1), Article 2176444. https://doi.org/10.1080/23311975.2023.2176444

Malik, A., Egan, M., & du Plessis, M. (2021). Managing sustainability using financial accounting data: The value of input-output analysis. *Journal of Cleaner Production*.

Marjulin, M., Hilmi, H., Mustaqim, T., Syafrizal, S. H., & Faisal, F. (2025). Does accounting digitalization bring business efficiency and effectiveness? *International Journal of Social Service and Research, 5*(10), 1285–1291. https://doi.org/10.46799/ijssr.v5i10.1334

Rinjani, D. F., & Haryadi, S. (2025). Perkembangan teori akuntansi: Tantangan dan peluang di era digital. *2*(3), 716–727.

Rosmala, C. (2024). Digital transformation in management accounting: Towards efficiency and competitive advantage. *Journal of Financial and Behavioural Accounting, 4*(1), 1–8. https://doi.org/10.33830/jfba.v4i1.7718.2024

Trinugroho, I., Pamungkas, P., Wiwoho, J., Damayanti, S. M., & Pramono, T. (2022). Adoption of digital technologies for micro and small business in Indonesia. *Finance Research Letters, 45*, Article 102156. https://doi.org/10.1016/j.frl.2021.102156

Wahyudi, S. R., Purwantini, A. H., & Farida, F. (2024). The adoption of cloud accounting by MSMEs: The role of digital vision and its impact on economic sustainability. *Jurnal Akuntansi Universitas Jember, 22*(2), 201–214. https://doi.org/10.19184/jauj.v22i2.52988

Yeye, N., & Ibrahim, S. (2025). Dampak penggunaan teknologi akuntansi berbasis digital terhadap efisiensi pengelolaan. *3*(3), 649–663.