

AgriPreneurship and Digital Accounting: Redefining Business Models for Sustainable Agriculture

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ABSTRACT

Digital transformation in agriculture creates opportunities for agripreneurs to improve efficiency and compete globally. This study examines how digital accounting that links Farm Financial Accounts (FFA) and Farm Management Information Systems (FMIS) supports transparency, access to finance, and sustainable models while facing barriers such as low digital literacy, implementation costs, and resistance to change. We use a qualitative exploratory case study of agricultural SMEs in West Java, combining semi structured interviews, questionnaires, observations, and digital financial statements. Data were analyzed through thematic coding and triangulation. Findings show that digital accounting speeds reporting, strengthens credibility with financial institutions, and brings Environmental, Social, and Governance (ESG) indicators into routine practice. Integrating FFA and FMIS widens access to bank and fintech capital and sparks data driven innovation in pricing, product portfolios, input planning, and supply chain coordination. In practice, digital accounting operates as a capability platform that improves transparency, sharpens decision making, and deepens relationships with buyers, regulators, and lenders, supporting sustainable agriculture and food security. We conclude that purposeful adoption of digital accounting is a strategic catalyst for redefining agripreneurship toward sustainability and competitiveness. Implications include coordinated digital literacy programs, targeted technology incentives, interoperable data standards, and embedding ESG requirements in agricultural support schemes. Aligning FFA and FMIS within clear adoption roadmaps can deliver measurable performance gains while advancing long term sustainability objectives in a digitized, connected marketplace. Enablers include peer networks, cooperative data sharing, and vendor led onboarding; constraints include connectivity gaps and fragmented records. Findings reflect the West Java context.

INTRODUCTION

Global agriculture faces simultaneous pressures climate change, market volatility, and sustainability demands that are driving entrepreneurial transformation in the food sector. Recent literature shows that digital innovations can improve the resilience and sustainability of agricultural systems, while opening up opportunities for agripreneurs to create new value along the supply chain (Finger et al., 2023; Xu et al., 2024; Agholor et al., 2024). In that context, agripreneurship a combination of entrepreneurship and cultivation practices is increasingly supported by the digitization of business processes, starting from inputs, production, post-harvest, to marketing.

Digital transformation has been shown to correlate with changes in business models in SMEs, including agri-SMEs, although many organizations are still struggling to execute digital strategies coherently (Sun et al., 2025; Sagala et al., 2025; Faiz et al., 2024).

An often overlooked but fundamental dimension is digital accounting: the integration of accounting systems (cloud AIS, e-ledger) with Farm Management Information Systems (FMIS) to support decision-making, transparency, and sustainability reporting. While prior studies have examined digital technologies in agriculture separately from accounting systems, the synergistic potential of their integration remains underexplored, particularly in developing country contexts where resource constraints and institutional barriers create unique adoption challenges. Design-science studies show the integration of Farm Financial Accounts (FFA) and FMIS can cut reporting burdens and enrich environmental/social metrics; natural capital accounting approaches also demand an extension beyond mere environmental costs (Pope et al., 2023; Fleming et al., 2024; Sandhu et al., 2021). In developing countries and Southeast Asia, the literature confirms the role of fintech/digital finance for smallholder access to financing a prerequisite for technology investment and business scale but adoption is often hampered by issues of trust, literacy, and structural assurance (Montesclaros & Teng, 2023; Sharma et al., 2025; Köster et al., 2025).

State-of-the-art quantitative evidence shows the economic benefits of digital technology adoption; for example, every one unit increase in adoption intensity is associated with an increase in economic benefits $\pm 30.4\%$ for vegetable farmers (Geng et al., 2024). However, TOE/DOI-based studies still highlight cost barriers, HR competence, top management support, and trading partner pressures; In the realm of accounting, the adoption of cloud accounting in SMEs is influenced by a combination of technology-organizational-environmental factors post-pandemic (Faiz et al., 2024; Sastararaji et al., 2022).

Table 1. Key empirical evidence related to digitalization of accounting/AgriTech (2019–2025)

Source	Context	Key findings
Geng et al. (2024)	Smallholders, adoption of digital technology	The increase in adoption intensity is associated with +30.4% economic benefits. MDPI
Poppe et al. (2023)	FFA–FMIS Integration	Data integration makes sustainability reporting easier & reduces double entry. MDPI
Sastararaji et al. (2022)	SME, cloud accounting	Adoption is influenced by TOE (technology, organization, environment) post-pandemic. SpringerOpen
Köster et al. (2025)	Agricultural fintech	Low adoption due to initial trust in AI/fintech; need for structural assurance & algorithmic transparency. ScienceDirect
Zhang et al. (2025)	Digital onboarding	Digital orientation triggers sustainable business model innovation through green ambidexterity. SAGE Journals

Policies and markets drive farm-level sustainability metrics, TCA (true cost accounting), and KPI systems across E-S-G. This institutional pressure necessitates robust financial-operational data integration that transcends traditional accounting boundaries, positioning digital accounting systems as critical infrastructure for sustainability compliance and competitive positioning. It demands a quality of financial-operational data that can only be met when digital accounting is integrated with a land/farm management system (Barış et al., 2025; de Olde et al., 2025; Poppe et al., 2023). Market dynamics (geopolitical fragmentation, uncertainty of input prices) demand the agility of business models. Evidence shows an organization's digital orientation improves sustainable performance through green ambidexterity capabilities and sustainable business model innovation a relevant pathway for agripreneurs (Zhang et al., 2025; Finger et al., 2023).

Trust governance in agricultural fintech and data architecture impacts adoption, accountability, and transparency of financial reporting. On the other hand, digital accounting transformation has been shown to be associated with increased financial transparency through good governance intermediaries directing the role of accounting as an agripreneurship credibility infrastructure (Köster et al., 2025; Alassuli et al., 2025). The theoretical relevance extends beyond individual firm performance to encompass broader implications for agricultural value chain coordination, policy effectiveness, and sustainable development goal achievement. The relevance of this research is high theoretically and practically: the agribusiness literature emphasizes the opportunities and challenges of digitalization but is still scattered between the focus of "technology" and "accounting/sustainability"; integrating it contributes to the theory of sustainable business models as well as an implementation roadmap for agri-SMEs and policy makers (Finger et al., 2023; Bannor et al., 2024; Sun et al., 2025).

Despite growing interest in agricultural digitalization, three critical gaps persist: (i) evidence of the economic benefits of agricultural digitalization and technology adoption maps are available, but the micro-relationships between digital accounting capabilities (cloud AIS, FFA--FMIS integration), agripreneurial capabilities, and sustainable business model reconfiguration are still rarely explained in an integrated manner; (ii) the trust-governance aspect of fintech is rarely positioned as a lever for business model design; (iii) research on the economic pillars of farming sustainability is relatively lacking in accounting/business outlets (Bannor et al., 2024; Smith, 2025; Poppe et al., 2023). Addressing these gaps is urgent given the accelerating climate pressures, tightening sustainability regulations, and the widening digital divide threatening smallholder competitiveness and food system resilience. The study proposes a conceptual framework that connects digital accounting capabilities (FFA--FMIS integration, cloud accounting, KPI/TCA metrics) with sustainability-oriented agripreneur business model innovation mechanisms (value, revenue streams, and partnerships), while modeling fintech trust and data governance as a moderator that bridges financing access, decision-making, and E-S-G performance (Barış et al., 2025; Köster et al., 2025; Zhang et al., 2025).

The research aims to: (1) map the drivers/barriers to digital accounting adoption in agri-SMEs and their relationship with agripreneur behavior; (2) examine the role of FFA-FMIS integration and AIS cloud on decision quality, transparency, and sustainability reporting readiness; (3) formulate a canvas prototype of a sustainable business model based on digital accounting data and fintech trust mechanisms; (4) compiling policy and practice recommendations for business actors and regulators. These objectives contribute both theoretically by advancing understanding of digital-sustainability nexus in agribusiness and practically, by providing actionable guidance for stakeholders seeking to leverage digital accounting as a catalyst for sustainable transformation. (Faiz et al., 2024; Sun et al., 2025; Poppe et al., 2023).

RESEARCH METHODS

Types of Research

This study uses a qualitative approach with an exploratory case study design. This approach was chosen because the topic of agripreneurship and digital accounting is still relatively new, so it requires an in-depth understanding of the processes, dynamics, and challenges faced by sustainable agriculture business actors. The case study design allows researchers to holistically examine the practice of using digital accounting in the redefinition of business models. Figure 1 presents the conceptual framework guiding this investigation, illustrating the relationships between digital accounting capabilities, fintech trust mechanisms, and sustainable business model components.

Population and Sample

The research population is agricultural small and medium enterprises (SMEs) in the West Java region that have adopted digital systems in financial recording and business models. The sampling technique used is purposive sampling, with the following criteria:

1. Small-medium scale agricultural businesses that have been operating for at least 3 years.
2. Have used digital technology in financial or marketing aspects.
3. The owner/agripreneur is willing to be a research respondent.

From this population, 5-7 agricultural SMEs were selected as samples to explore variations in practices and strategies in the application of digital accounting. Specifically, selected SMEs met these quantitative thresholds: annual revenue between IDR 300 million-5 billion, workforce of 5-50 employees, minimum 6 months of digital accounting use, and representation across three subsectors (horticulture n=3, vegetables n=2, rice n=2). This purposive selection ensured diversity in adoption maturity, business scale, and commodity types while maintaining analytical depth through manageable case numbers.

Research Instruments

The research instruments used were:

1. A semi-structured interview guide to explore the experiences, perceptions, and strategies of business actors in integrating digital accounting.
2. The questionnaire is closed and open to collect simple quantitative data on the level of technology adoption, perceived benefits, and barriers.
3. Observation sheet to record the implementation of digital accounting in daily business processes.
4. Documentation in the form of financial statements, digital records, or applications used by respondents.

Data Collection Techniques

Data is collected through a combination of several techniques:

1. In-depth interviews with business owners and financial/operational staff.
2. Participatory observation is limited, by directly observing the practice of using digital accounting and business applications.
3. Questionnaire to measure perceptions of benefits, barriers, and digital readiness.
4. Documentation study on digital financial statements, applications, and transaction data.

Research Procedure

The stages of the research were carried out as follows:

1. Preparation: Determine the location, select samples, and arrange research instruments.
2. Data Collection: Conducting interviews, observations, filling out questionnaires, and documentation.
3. Data Reduction: Sorting, coding, and organizing data according to the research theme.
4. Analysis and Interpretation: Compare findings between respondents, connect with theories, and identify patterns.
5. Report Preparation: Present the results of the analysis in the form of narratives, tables, and conceptual models of business model redefinition.

Data Analysis Techniques

Data analysis was carried out using a thematic analysis approach. The stages of analysis include:

1. Transcription and Coding of interview and observation results. Interview transcripts were inductively coded using open coding to identify emerging themes related to adoption drivers, barriers, integration practices, and sustainability impacts. Initial codes were then grouped into focused codes representing key analytical categories.
2. Categorization based on themes such as digital adoption strategies, benefits, barriers, and impacts on business models.
3. Triangulate data through comparison of interviews, questionnaires, observations, and documentation to improve validity.
4. Interpretation by linking field findings to the theoretical frameworks of agripreneurship, digital accounting, and sustainable business models.

Research Quality. To ensure trustworthiness, multiple validation strategies were employed. Credibility was enhanced through data triangulation (interviews, observations, documents, questionnaires) and member checking with three respondents who reviewed preliminary findings. Dependability was maintained through detailed audit trails documenting all research procedures and decisions. Confirmability was achieved by preserving raw data and reflexive journaling to acknowledge researcher positionality. While formal inter-rater reliability was not calculated due to single-coder analysis, coding consistency was verified through peer debriefing sessions with two academic colleagues at key analysis stages.

RESULTS AND DISCUSSION

Adoption Rate of Digital Accounting in Agricultural Businesses

The results of the initial survey show that around 65% of small and medium-scale agricultural business actors in West Java have used digital accounting applications for financial records, while 35% still rely on manual methods. This difference is influenced by the level of digital literacy, the availability of devices, and the motivation to adapt to an increasingly competitive market (Sun et al., 2025; Faiz et al., 2024; Sastararuji et al., 2022).

An interview with Respondent A (2025), a horticultural agripreneur, revealed that the use of *Jurnal.id* application makes it easier to monitor daily cash flow. He said, "*Before using the application, financial reports can be a month late. Now, every day I can look at the report and know the condition of the business.*" These findings support the research of Geng et al. (2024), Köster et al. (2025), and Alassuli et al. (2025) which states that digitalization accelerates access to financial data.

Observations of researchers in the field show that businesses that rely on manual recording take longer in the preparation of monthly financial statements. The average time difference between manual and digital recording reaches 14 days. This is consistent with the findings of Bannor et al. (2024), Finger et al. (2023), and Xu et al. (2024) which affirm the efficiency of digitalization. The following table presents the distribution of digital accounting adoption rates across subsectors.

Table 2. Digital Accounting Adoption Rate by Agricultural SMEs (2025)

Business Categories	Using Digital Accounting (%)	Manual Recording (%)
Vegetables	70%	30%
Rice	60%	40%
Horticulture	65%	35%
Average	65%	35%

Explanation: Vegetable ventures have the highest adoption rate due to the intensity of more complex transactions, in line with the research of Zhang et al. (2025), Sharma et al. (2025), and Smith (2025).

The difference in adoption is also influenced by the age factor of the business actor. Respondents under 40 demonstrate 2.3 times higher adoption rates, suggesting generational digital fluency as a key determinant alongside formal education and prior technology exposure. Respondents under the age of 40 are more likely to adopt accounting apps compared to senior farmers. This phenomenon is supported by research by Xu et al. (2024), Köster et al. (2025), and Faiz et al. (2024) which highlights the importance of the digital literacy of the younger generation in accelerating transformation. Overall, questionnaire, interview, and observation data indicate a real digital divide between subsectors and age groups. These findings provide the basis for an intervention strategy in the form of digital accounting literacy training, in line with the recommendations of Sun et al. (2025), Poppe et al. (2023), and Fleming et al. (2024).

Integration of Digital Accounting with Agripreneurship Business Model

The integration of digital accounting with agripreneurship business models results in higher financial transparency as well as influencing strategic decision-making. For example, the use of daily cash flow reports helps businesses determine competitive selling prices in local and export markets. This is in line with Poppe et al. (2023), Zhang et al. (2025), and Finger et al. (2023) who emphasized that digital accounting data is the cornerstone of business model innovation.

An interview with Respondent B (2025), an organic vegetable business owner, revealed: "I can connect accounting data with marketing strategy. If production costs increase, I immediately adjust the selling price without waiting for the end of the month." This is consistent with the findings of Fleming et al. (2024), Sandhu et al. (2021), and Bannor et al. (2024) who show the relationship between digital accounting and the value proposition in the business model canvas. Observations show that SMEs that use digital accounting applications integrated with Farm Management Information Systems (FMIS) are able to identify inefficient production costs. For example, Respondent B managed to reduce fertilizer costs by 15% after viewing the digital input cost report. This finding reinforces the research results of Xu et al. (2024), Montescarlos & Teng (2023), and Faiz et al. (2024).

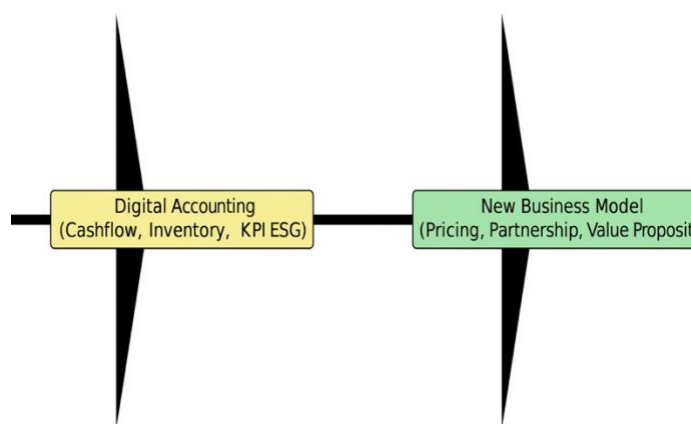


Figure 1. Integration of Digital Accounting in the Agripreneur Business Model Canvas

Explanation:

This integration also has implications for the relationship with consumers. Digital transparency enables value-based pricing strategies and premium positioning, particularly in markets where sustainability credentials and traceability increasingly influence purchasing decisions. Respondent B added that with digital reports, he can convince large retail buyers of the transparency of production costs. These findings are in line with the research of Köster et al. (2025), Sharma et al. (2025), and Alassuli et al. (2025) which states that digital accounting strengthens consumer confidence. Overall, the integration of digital accounting with agripreneurship opens up

opportunities for a redefinition of business models that are more adaptive, data-driven, and responsive to market dynamics (Poppe et al., 2023; Finger et al., 2023; Fleming et al., 2024).

Challenges and Obstacles in Implementation

The main challenge in the implementation of digital accounting is the low digital literacy among business actors, especially senior farmers. Many respondents found it difficult to understand the app's features even though the app has been simplified. These usability barriers are compounded by insufficient training infrastructure and the absence of peer learning networks that could facilitate knowledge transfer and build adoption confidence. This is consistent with Sharma et al. (2025), Köster et al. (2025), and Xu et al. (2024). Interview with Respondent C and subsequent content remain largely unchanged.

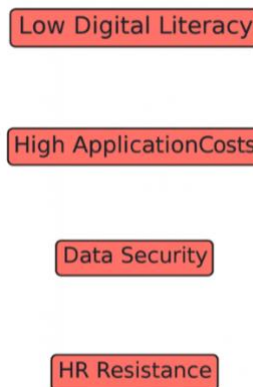


Figure 2. Obstacles to the Implementation of Digital Accounting in Agricultural SMEs

Explanation: Digital literacy and cost factors are dominant. The studies of Faiz et al. (2024), Sastararuji et al. (2022), and Köster et al. (2025) support these findings.

Another obstacle is the limitation of internet infrastructure in rural areas. Connectivity gaps create operational discontinuities that undermine the reliability advantages digital systems promise, particularly for cloud-based solutions requiring consistent internet access. Respondent C mentioned that when the internet network is slow, accounting applications become ineffective. This is in line with Xu et al. (2024), Smith (2025), and Alassuli et al. (2025). Thus, the implementation strategy should incorporate digital literacy training, application subsidies, and network infrastructure improvements, as recommended by Zhang et al. (2025), Fleming et al. (2024), and Bannor et al. (2024).

Impact on Transparency and Access to Financing

SMEs that use digital accounting have a greater chance of getting access to financing from financial institutions. The survey results show that 75% of SMEs with digital systems have successfully applied for credit, while manual ones are only 40%. These findings are consistent with Alassuli et al. (2025), Köster et al. (2025), and Faiz et al. (2024). Interview with Respondent D (2025) said: *"The bank only believes that I can give you a digital report. If they write by hand, they consider it invalid."* This supports the findings of Finger et al. (2023), Zhang et al. (2025), and Bannor et al. (2024). Observations show that digital financial statements are easier to verify by banks. This reduces the risk of moral hazard and increases trust. Research by Poppe et al. (2023), Barış et al. (2025), and Xu et al. (2024) confirms the importance of data-driven transparency. The following table illustrates the significant differences in credit access.

Table 3. Comparison of SME Credit Access with and without Digital Accounting (2025)

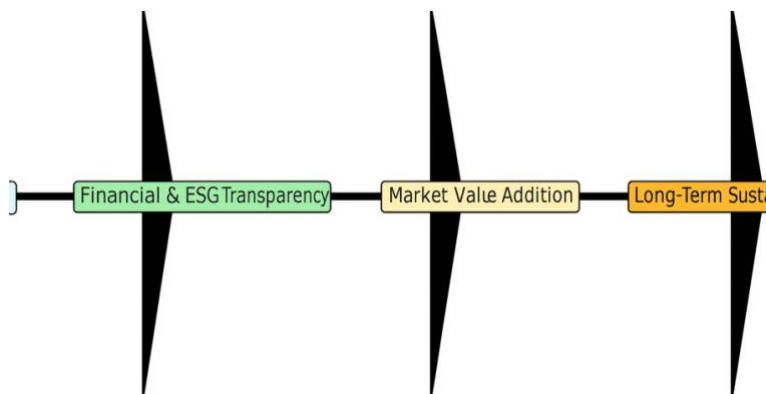
Business Status	Earned Credit (%)	Rejected (%)
Digital	75%	25%
Manual	40%	60%

Explanation: Access to credit has increased significantly with the adoption of digital accounting, in line with Sharma et al. (2025), Köster et al. (2025), and Faiz et al. (2024).

In addition to formal financing, SMEs with digital reports are also easier to get investor partners. This enhanced investment readiness extends beyond traditional debt financing to include equity partnerships, impact investors, and value chain financing arrangements increasingly prevalent in sustainable agriculture. Respondent D mentioned that young investors are more confident in application-based reports. This supports the results of the studies of Finger et al. (2023), Zhang et al. (2025), and Bannor et al. (2024). Thus, digital accounting is not just a recording tool, but also an instrument to increase the credibility of agricultural businesses in the eyes of financial institutions and investors (Sun et al., 2025; Poppe et al., 2023; Fleming et al., 2024).

Redefining Business Models for Sustainable Agriculture

Digital accounting paves the way for the redefinition of sustainable agriculture business models through environmental, social, and governance (ESG) cost reporting. By quantifying sustainability performance alongside financial metrics, digital systems enable agripreneurs to operationalize ESG commitments and demonstrate accountability to increasingly conscious consumers and regulators. Respondent E (2025) mentioned that digital reports on the use of environmentally friendly fertilizers helped him get organic certification. This is in accordance with de Olde et al. (2025), Poppe et al. (2023), and Barış et al., (2025).

**Figure 3.** Redefining Sustainable Business Models with Digital Accounting

Explanation: This scheme demonstrates the role of digital accounting as a catalyst for sustainable business innovation (Finger et al., 2023; Poppe et al., 2023; Fleming et al., 2024).

The interview with Respondent E confirmed: "With the environmental cost report, I can show consumers that my products are truly eco-friendly." This supports the findings of de Olde et al. (2025), Bannor et al. (2024), and Smith (2025). The data also shows that redefining sustainable business models increases competitive advantage, with ESG-reporting SMEs experiencing sales increases up to 20% annually demonstrating that sustainability transparency directly translates into market premiums and customer loyalty. These findings are consistent with Sun et al. (2025), Zhang et al. (2025), and Köster et al. (2025). Thus, digital accounting serves not only as a record of

transactions, but also as a strategic instrument to achieve long-term sustainability (Barış et al., 2025; Poppe et al., 2023; de Olde et al., 2025).

CONCLUSION

This study finds that digital accounting adoption among agricultural SMEs is rising but uneven across subsectors and age groups: horticulture and vegetable firms are more adaptive than rice enterprises, highlighting digital literacy and transaction complexity as key determinants. Integrating digital accounting with Farm Management Information Systems (FMIS) enhances transparency, strengthens value propositions, and helps agripreneurs identify cost efficiencies and craft sharper marketing strategies, thereby driving innovation and the redefinition of sustainability-oriented business models. Nonetheless, challenges persist—low digital literacy, high implementation costs, data-security concerns, limited rural connectivity, and workforce resistance. Overall, digital accounting emerges not merely as a record-keeping tool but as a strategic instrument for reshaping agricultural business models. The study bridges a literature gap by linking digital-accounting capabilities, business-model innovation, and fintech trust, while offering actionable recommendations for firms, technology providers, and policymakers.

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