# SMART SYSTEM FARMING MANAGEMENT : FINTECH ASPECTS IN PRODUCTION AND MARKETING AT EDRIAN BULE FARM LAMPUNG

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**Abstract**

The development of technology-based livestock farming is increasingly being driven by government programs that focus on digitization, productivity improvement, and the integration of modern technology in livestock management. These initiatives include training, the provision of digital platforms, and infrastructure support to strengthen the livestock supply chain. However, their implementation in the field still faces various obstacles, such as limited internet access and the high cost of technological devices. In addition, low digital literacy and readiness to adopt technology among farmers are also challenges that need to be overcome. Translated with DeepL.com (free version)This study aims to develop an integrated livestock management model using Smart System Farming Management and FinTech technologies to improve production and marketing efficiency at Edrian Bule Farm in Lampung. Using a grounded theory approach, this study explores the challenges faced by farmers in managing production and finances and how technology can be used to overcome these problems. Through inductive qualitative data analysis, this study successfully identified the main needs of farmers in terms of production and financial management, as well as the factors that influence technology adoption. The results of this study are expected to provide an overview of the influence of financial knowledge and technology or FinTech on livestock businesses, particularly in Lampung Province, and to understand the role of integration between smart agricultural technology and digital-based financial solutions that can improve operational efficiency, expand market access, and facilitate access to financing for small to medium-scale farmers.

Keywords : FinTech, Grounded theory, Smart System, Farming

## INTRODUCTION

The Indonesian government continues to encourage the development of the agricultural sector, particularly livestock farming, by launching a series of programs based on the latest technology (OECD, 2020). The smart livestock program is part of the digital transformation of agriculture under the Ministry of Agriculture, which adopts IoT, sensors, big data, and artificial intelligence technologies to improve efficiency, reduce production costs, and provide real-time data for decision making (Kementrian Pertanian, 2019). In addition, the development of green livestock emphasizes the application of environmentally friendly technologies, such as biogas, feed efficiency, and livestock waste management, which support the achievement of the Sustainable Development Goals (World Bank, 2019). On the other hand, the livestock sector has a significant economic contribution. In 2023, this sector will contribute 12.4% to Indonesia's GDP, while the growth of the livestock sub-sector reached 6.24% in 2022, emphasizing the importance of modernization through digitalization to maintain the competitiveness and sustainability of the livestock sector (Hasan & Lubis, 2021).

The livestock sector in general has not widely implemented a Financial Technology (FinTech)-based agricultural management system, which is the answer to problems such as declining sales, input efficiency, operational constraints, and other issues. Technology-based agricultural management systems, or smart system farming management, are expected to optimize production processes, resource management, and improve operational efficiency in the agricultural industry (Klerkx, *et.al*, 2019). Edrian Bule (EB) Farm Lampung has not yet acquired the application of technology or is still

limited to traditional systems, which has resulted in a decline in livestock sales performance and production management. Anticipating these problems highlights the important role of digital marketing in the process of increasing production and income (Bungin, 2020).

This study identifies various factors that influence low technology adoption, such as limited knowledge, inadequate infrastructure, and resistance to change. In addition, this study also reveals factors that cause a decline in livestock sales, including a lack of monitoring and accurate data analysis for decision making. Based on these findings, this study develops a basic theory that includes strategies to improve technology implementation in agricultural management, especially livestock, and solutions to increase competitiveness and livestock sales. This study aims to explore and understand the problems faced by the agricultural sector, especially livestock farming, which contributes significantly to food security and community welfare. The results of this study are expected to contribute to the development of technology-based agricultural management and financial models in Indonesia, specifically aimed at improving livestock business performance.

## RESEARCH METHOD

This study uses a qualitative approach to examine in depth the problems faced by farmers in production and financial management at EB Farm Lampung. This approach focuses on understanding the phenomena occurring in the field through the perspectives of the main actors (farmers, EB Farm Lampung managers, parties involved in the financial sector, and other stakeholders). This study uses grounded theory as the main method in developing a theory based on field data, rather than existing theories (Strauss & Corbin, 1998). This research approach is appropriate for exploring complex and poorly understood phenomena, such as the integration of Smart System Farming and FinTech technologies in livestock farming. Data collection was carried out using various qualitative techniques such as in-depth interviews, direct observation, and field documentation studies (Moleong, 2017). The analysis process was carried out iteratively, with the collected data analyzed inductively, meaning that new theories or concepts would develop based on the available data. After the data collection process, it is necessary to change the data code to adjust and identify the main concepts or themes that emerge. Once the data acquisition process has been completed, the next step is to combine the concepts found to identify the relationship between phenomena, such as how production and marketing are carried out in the research object (Rahmawati & Yusuf, 2019). Selecting and developing relevant main categories to build a theory will be done once the entire data process has been completed. Based on the analysis results, researchers will develop a model or theory that describes how Smart System Farming and FinTech can be integrated to improve operational and production efficiency as well as access to financing in livestock farming. Interviews will be conducted by researchers directly with farmers, managers, and related parties such as technology providers, financial institutions such as banks or peer-to-peer (P2P) lending platforms (Wibowo, 2018).

The grounded theory approach is used in this study to link the application of Smart System Farming Management at EB Farm Lampung. This approach is highly relevant to the research objective of developing new theories based on field findings, rather than testing existing theories. This approach allows researchers to explore in depth how smart farming technology is implemented, accepted, and influences farming practices at EB Farm Lampung. The research process that will be carried out by the researcher is to collect

data from relevant documents, such as farm financial reports, transaction records, reports on the use of applied technology, and related policies or regulations that may affect the operations and finances of farmers, which are broadly conducted based on interviews. These interviews aim to identify problems encountered, both in terms of production efficiency of livestock inputs to produce good quality meat or breaders, as well as in terms of finance, such as difficulties in accessing financing and the use of financial technology (USAID, 2021). The analysis process in grounded theory begins with the open coding stage, which involves breaking down data from interviews, observations, or documents into units of meaning to find initial concepts without any preconceived theories (Strauss & Corbin, 1998). At this stage, researchers read the data in depth, label important statements, and identify variations in the phenomenon through the constant comparative method, which is a technique of comparing each new piece of data with existing concepts. This approach ensures that the initial categories truly originate from the empirical experiences of the informants, as also emphasized in qualitative research methodology (Böhm, 2004). Researchers will be directly involved in activities at EB Farm in Lampung to observe the production process and farmers interactions with technology. These observations will provide insights into how technology is used in farmers' daily lives and how they manage their finances.

## RESULTS AND DISCUSSION

The research activity began with coordination with the owner or partner of EB Farm Lampung, located at Blk. JK, Fajar Baru, Kec. Jati Agung, Kabupaten Lampung Selatan, Lampung 35141. After coordinating and obtaining approval from the partner to be used as a research object, the group leader assembled members based on their expertise and suitability for the research activities. The coordination with the owner aimed to develop and implement a suitable Smart System Farming Management model that utilizes financial technology (FinTech) to improve production efficiency, financial transparency, and marketing optimization at EB Farm Lampung. The results of interviews with farmers directly led to an agreement that the research focus would be on the digitization of the farming process, particularly related to operational recording, financial management, and livestock marketing. Initial observations showed that the farm still relied on manual systems, making it prone to recording errors, delays in financial reports, and a lack of data integration between departments. There were also findings regarding the delivery or transport of livestock to buyers, where the delivery process outside the island of Sumatra requires special attention to the condition of the livestock and the feeding (weight or size of the livestock), which turned out to be unsatisfactory after being received by the buyers. However, the context of this transportation issue will be used as input for the next stage of research related to production and market expansion or marketing coverage of EB Farm Lampung livestock.

Initial data collection was conducted through questionnaires divided into several categories related to digital financial literacy and smart farming, as well as structured interviews with 11 employees working in the goat, cattle, and administration divisions. The purpose of this data collection was to understand the operational obstacles faced by employees and to identify opportunities for integrating digital technology and smart farming to support work processes. The initial data obtained will later become the basis for developing a more efficient system model (Wolfert, et.al, 2018). The questionnaire was designed based on the main objective of the study, which is that there are weaknesses in the manual system in livestock farming. The manual system in livestock management

has many fundamental weaknesses, mainly because it still relies on paper-based records and workers' memories. This condition makes data prone to errors, negligence, and even potential fraud, especially in livestock expenditure and sales activities (Smith, *et.al*, 2021). At the EB Farm Lampung farm, unstructured manual recording often results in important information such as livestock age, health history, and vaccination schedules being incomplete, difficult to trace, or even lost. These findings are in line with national and international literature showing that manual systems produce data inconsistencies and can reduce the quality of managerial decisions (World Bank, 2019). As a result, decisions related to livestock health, reproduction, and productivity are often not based on accurate and real-time data, thereby increasing the risk of operational errors and financial losses.

The risk of loss is even greater when transactions are not transparent due to the absence of digital records. Expenditures for feed, medicine, or equipment can become uncontrolled due to the lack of proper documentation, leading to waste and repeated purchases (USAID, 2021). In addition, sales of products such as milk, meat, and live livestock may not be fully reported, resulting in a loss of income that goes unnoticed by business owners. Other risks include the loss or theft of livestock that is difficult to trace due to the absence of a digital-based identification and tracking system. National and international studies confirm that without technologies such as monitoring sensors, cases of lost, sick, or dead livestock are often unrecorded and ultimately cause significant losses to farm owners (Smith, 2021). Without digital verification and audit mechanisms, the opportunities for data manipulation and abuse of authority are higher, while operational irregularities are difficult to detect (Rutten, et.al, 2013). As a solution, the concept of smart system farming management is a modern approach that integrates internet of things (IoT) technology, sensors, big data, AI, and cloud-based management systems to improve farm efficiency and transparency (FAO, 2020). Smart farming aims to transform traditional practices into a more measurable and data-driven system (Dirjen PSP, 2023). In the context of EB Farm Lampung, sensor technology can be used to automatically monitor livestock conditions, detect changes in behavior or health in real-time, and optimize feeding with precision. From an administrative perspective, the digitization of financial and operational records enables purchase, sale, and expenditure transactions to be recorded automatically and integrated, resulting in more accurate and easily audited reports (Siregar, 2020). With data collected in a structured and sustainable manner, owners can analyze production trends, feed efficiency, and livestock performance to support strategic decision-making (Kusumo, 2022). Therefore, the implementation of smart farming is not only a solution to the weaknesses of manual systems but also an important foundation for EB Farm Lampung to realize efficient, transparent, professional, and sustainable livestock farming in the future.

After conducting a series of interviews, the next step is to determine the research method, namely grounded theory. This method was chosen because it is able to explore and construct theories directly from the experiences, interactions, and realities faced by actors in the field (Charmaz, 2006). In the context of research on challenges in the agricultural or livestock sector, this method allows researchers to understand phenomena in depth without being limited by initial theories. grounded theory emphasizes the simultaneous collection and analysis of data, which helps researchers capture patterns, categories, and concepts that truly emerge from empirical data (Glaser, 1967). In addition, the grounded theory method is particularly relevant when researchers want to examine complex, dynamic, and under researched issues, such as the application of digital technology or FinTech based management systems in the agricultural sector. Through this approach, a comprehensive understanding of obstacles, stakeholder perceptions, and

unmet needs can be developed. This approach provides flexibility to adjust the focus of the research as new findings emerge from field data, in the development of an interpretive constructivist grounded theory (Rachman *et. al*, 2025).

Grounded Theory was also chosen for its ability to generate new theories that are practically relevant. In research aimed at providing recommendations for new systems or strategies, such as those related to smart system farming management, this approach allows for more contextual and applicable results. Grounded Theory is particularly suitable for formulating theories that can serve as the basis for policy or social intervention because it is built on real findings, not theoretical assumptions. Thus, the resulting theory is empirically stronger and has a higher potential for implementation by stakeholders (Urquhart, 2013). The next stage is axial coding and selective coding, which is the process of connecting categories and subcategories based on cause-and-effect relationships, contextual conditions, and the consequences of the phenomenon being studied. In the axial coding stage, researchers compile relationship patterns so that the initial structure of the theory begins to emerge, followed by selective coding to select the core categories that form the center of the substantive theory being constructed. All of these processes occur cyclically until data saturation is reached, which is when no new concepts are found. Thus, grounded theory analysis produces a theory that is consistent, in-depth, and truly rooted in field data, in the context of qualitative research in Indonesia.

**Table 1**. *Open Coding*

| Aspect | Interview Findings (Qualitative Summary) | Number of Respondents (n=11) | Percentage |
|---|---|---|---|
| Manual System in Operation | Records are still kept in notebooks, reports are unstructured, data is easily lost and difficult to trace. | 9 | 81.8% |
| Manual System Constraints | Wasteful spending on feed and medicine, inaccurate production data, risk of livestock stock discrepancies, frequent delays in sales reports. | 10 | 90.9% |
| Readiness to Adopt Fintech Systems | Most employees are willing to switch to a digital system, but they need training on how to use the application. | 7 | 63.6% |
| Production Aspects | There are no daily records regarding feeding, health, or livestock growth; it is difficult to analyze production performance. | 8 | 72.7% |
| Marketing and Sales Aspects | Marketing is still conducted through offline networks; communication with buyers is not well documented; prices often change without control. | 9 | 81.8% |
| Smart Farming / Technology | The majority are not yet familiar with IoT, digital monitoring, or Fintech integration; however, they are very open to technology that can make their work easier. | 6 | 54.5% |

Primary Data Processed (2025)

During the open coding stage, all transcripts of interviews with 11 EB Farm Lampung employees were read repeatedly to identify concepts, issues, and work experiences that emerged repeatedly from the field. Each important statement was then given an initial code such as “manual recording,” “data loss,” “potential fraud,” “digital literacy limitations,” “readiness to switch to applications,” “production constraints,”

"offline marketing," and "interest in smart farming." These codes were then compared with each other using the constant comparative method to identify similarities and differences, thereby forming larger initial categories. This process yielded six main categories: (1) existing manual systems, (2) limitations of manual systems, (3) readiness to adopt Fintech, (4) production aspects, (5) marketing and sales, and (6) the concept of smart farming shown in Table 1. These categories are the initial foundation for understanding the patterns of problems that exist at EB Farm and form the basis for the next stage, namely axial coding, which connects the cause-and-effect relationships between categories. Open coding in this study shows that the core problem stems from an inaccurate and non-transparent manual recording system, which has an impact on production, finance, and marketing. A total of 81.8% of respondents stated that recording activities, both purchases and production, is still done using notebooks, making data easy to lose, unstructured, and difficult to trace. This condition is compounded by the finding that 90.9% of employees directly experience various obstacles from the manual system, such as wasteful purchases of feed and medicine, discrepancies in livestock stock, and late sales reports due to having to be recalculated manually. When asked about their readiness to switch to a Fintech system, 63.6% of respondents stated that they were willing to adopt a digital system, although they emphasized the need for training so that they could use the application with confidence.

From an operational production perspective, 72.7% of employees said that there was no daily recording of feed, health, and livestock growth, making it difficult to analyze production performance and often resulting in delayed corrective actions. In terms of marketing and sales, 81.8% of respondents explained that marketing still relies on offline networks, without proper documentation of communication with buyers, and product prices often fluctuate without a control mechanism. Meanwhile, understanding of smart farming is still relatively low, as seen from only 54.5% of respondents who are familiar with or understand technologies such as IoT, livestock health sensors, or Fintech integration in livestock farming. Nevertheless, the majority of this group stated that they are very open to using technology if it can simplify their work and improve farm performance. These findings indicate that despite various weaknesses in the manual system, the level of acceptance of digitalization is quite high and can be an important foundation for the transformation towards smart farming. In the axial coding stage, the initial categories resulting from open coding are analyzed in greater depth to find logical relationships between them through a paradigm model that includes causal conditions, context, intervening conditions, action strategies, and consequences as shown in Table 2. This process is carried out by connecting pieces of data so that the structure of the problem at EB Farm becomes clearer. This analysis found that the manual system is a causal condition that leads to various forms of operational inefficiencies, such as recording errors, potential waste, and the risk of livestock loss. This situation is reinforced by contextual conditions, such as traditional work culture and limited digital infrastructure. At the same time, factors such as varying digital literacy and the readiness of some employees to switch to technology act as intervening conditions that influence the acceleration or hindrance of change. All these factors lead to action strategies, namely the digitization of recording, the implementation of Fintech, and the introduction of IoT-based smart farming. Ultimately, these strategies yield positive consequences, including improved cost efficiency, data transparency, livestock monitoring effectiveness, and data-driven decision-making quality. Thus, axial coding integrates all initial categories into a relational structure that explains how problems arise and how solutions can be systematically applied.

**Table 2**. *Axial Coding*

| Axial Coding Components | Analysis Results |
|---|---|
| Main Phenomena | Management inefficiency due to manual systems |
| Causal Conditions | Manual recording, no data standards, minimal technology |
| Contextual | Limited infrastructure, manual work culture, traditional marketing |
| Intervening | Readiness to adopt Fintech, management support, varying levels of digital literacy |
| Action Strategy | Digitalization, Fintech, smart farming, training |
| Consequences | Efficiency, transparency, minimal risk, increased production |

Primary Data Processed (2025)

In the selective coding stage, all axial coding results are combined to identify and formulate core categories that can comprehensively explain the patterns of relationships between categories shown in Table 3. This process begins by reviewing all the main categories that have been formed, ranging from manual systems, operational constraints, technological readiness, production and marketing aspects, to smart farming, and then evaluating their connection with the most dominant main phenomena. Through this filtering and integration process, a central theme was obtained that summarizes the problem and the direction of the solution, namely "Transformation of the Farm Management System through Digitalization and Smart Farming to Overcome Operational Inefficiencies due to Manual Systems." This core theory describes that the root of the problem at EB Farm Lampung is its dependence on inaccurate manual recording, while factors such as digital literacy, Fintech adoption readiness, and technology availability act as both obstacles and opportunities in the change process. Selective coding also produced a theoretical storyline explaining that digitization and the application of smart farming are not only a response to inefficiencies, but also a strategic step to improve transparency, effectiveness, productivity, and the sustainability of the livestock business. Thus, selective coding brings all categories together into a cohesive and grounded theory, one that is truly born from EB Farm Lampung's field data.

**Table 3**. *Selective Coding*

| Category | Role in Theory | Explanation |
|---|---|---|
| Manual System | Source of the problem | Causes inefficiency, stock discrepancies, risk of loss |
| Manual System Constraints | Strengthening factor | Lack of digital literacy, inappropriate SOPs, limited infrastructure |
| Readiness for Fintech Adoption | Determining factors | Determining the success of digital system implementation |
| Production Aspects | Area of change | Requires sensors, automatic recording, IoT |
| Marketing & Sales | Areas requiring integration | Digital marketing, customer database |
| *Smart Farming* | Key solutions | Generating real-time data, improving efficiency |
| *Core Category* | Central themes | Digital transformation as a solution to inefficiency |

Primary Data Processed (2025)

## CONCLUSION AND SUGGESTION

The conclusion of this grounded theory based study shows that weaknesses in the manual systems in the areas of finance, marketing, and production are the main sources of inefficiency at EB Farm Lampung, thereby driving the need for transformation towards digitalization and Smart Farming. In terms of the financial system, manual recording leads to inaccurate reports, delays in information, and vulnerability to manipulation, thereby hindering business planning. In terms of production, the lack of real-time monitoring of cattle health and the absence of automated data on feed, body weight, or barn conditions lead to a high risk of disease and wasteful use of resources. Meanwhile, in terms of marketing, traditional methods that rely on direct sales without a digital system limit market reach and make sales fluctuations unpredictable. The analysis shows that these obstacles are mediated by the level of readiness to adopt technology, such as employee digital literacy, infrastructure availability, and resistance to change. Thus, the substantive theory formed concludes that digital integration in financial, marketing, and production systems is the main determinant of achieving efficiency, transparency, and effectiveness in sustainable livestock businesses. Based on this study, EB Farm Lampung is recommended to implement integrated digitalization in financial, production, and marketing systems to improve efficiency and transparency. Digital financial tools can enhance data accuracy and support better planning, while Smart Farming technologies enable real-time monitoring of cattle health and resource use. In addition, digital marketing adoption can expand market reach and stabilize sales. To support this transformation, improvements in employee digital literacy, infrastructure readiness, and change management are essential to achieve sustainable livestock business performance.

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