


## Analysis of the use of information and communication technology in agribusiness management

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Article Info	ABSTRACT
<p><b>Keywords:</b> Information and Communication Technology, Agribusiness Management</p>	<p>The development of information technology has had a significant impact on various sectors, including agribusiness. In this context, this research will focus on how agribusiness actors adopt and utilize information technology to increase the efficiency, productivity and sustainability of their operations. This research aims to analyze the use of information technology in the context of agribusiness management. This research uses a qualitative approach with a literature study method. The research results show that the use of information technology, such as Management Information Systems (SIM) and mobile applications, has a positive impact on agribusiness management by increasing farmers' operational efficiency. The use of Internet of Things (IoT) and sensors in weather and crop monitoring helps in smarter decision making, while RFID and drone technology supports inventory tracking and farmland monitoring. E-commerce platforms facilitate direct transactions between farmers and consumers, opening wider market access. In the supply chain, technology minimizes waste, increases distribution efficiency, and ensures the safety of agricultural products. Overall, this research confirms that the integration of technology in agribusiness management makes a significant contribution to increasing the productivity and sustainability of the agricultural sector.</p>
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### INTRODUCTION

The agricultural sector has a strategic role in human life, playing a crucial role as a provider of clothing, food and shelter. As an agricultural country, the agricultural sector is the main basis for the lives of Indonesian people, rich in biodiversity and vegetation which has great potential (Rahman, 2018). Agricultural production facilities, such as land, capital, labor and technology, are important elements in supporting the sustainability of this sector. However, often one of the forgotten means of production is information (Murdiyanto & Kundarto, 2012).

In the agricultural context, information has a very determining role in business success. Without adequate information, farmers have difficulty developing their businesses (Mukti et al., 2018). They may not know the extent of the potential success of their agricultural business, whether it will be profitable or detrimental. Information also allows

farmers to find out market needs for certain commodities, helping them determine the right amount of production to achieve profits (Khusna et al, 2019).

Soekartawi (2007b) highlighted that global changes have had a significant impact on the agricultural sector in Indonesia. Structural transformation occurred, one of which was the emergence of the role of Information Communication and Technology (ICT) which penetrated various aspects of life, including agricultural activities. Understanding and mastery of information and technology is the key to success, where those who can absorb information effectively will be superior (Soekartawi, 2007)

Along with the development of ICT, farmers who are able to access information and master technology earlier will gain greater profits. Adoption of information technology in agriculture can increase efficiency, productivity and competitiveness (Kurdi et al, 2023). Therefore, it is important for the government, research institutions and agricultural actors to work together to ensure broad access to information and technological provision for farmers, so that the Indonesian agricultural sector can continue to develop in the face of global and technological change (Fardi, 2014).

In the context of agribusiness management, the use of information technology is the key to increasing management efficiency and effectiveness in the agricultural sector. Agribusiness management includes planning, organizing, directing and controlling various aspects of agricultural business activities (Putra et al, 2023). Accurate and timely information through information technology can help in making strategic decisions, such as determining the types of plants suitable for planting, production planning, risk management and marketing strategies (Sholikhah, 2021).

The application of information technology in agribusiness management can also increase connectivity between industry players, including farmers, producers, distributors and consumers (Lesmana, 2023). A well-integrated agribusiness management system through an information technology platform can speed up the flow of information and transactions throughout the supply chain, reduce the risk of uncertainty, and increase the sustainability of the agribusiness system (Intyas et al., 2022).

However, the challenge that arises is how to ensure equal access and adoption of information technology throughout the agribusiness chain (Verinda & Rahman, 2024). Collaborative efforts are needed between the government, the private sector and research institutions to provide training, mentoring and supporting infrastructure so that agribusiness actors can integrate information technology well in their management practices (Rachmawati & Gunawan, 2020).

Thus, the use of information technology in agribusiness management is not just a tool, but is a strategic necessity to face the dynamics of change in the agricultural sector (Indraningsih et al, 2010). Good integration between information technology and agribusiness management can be a catalyst for progress in the agricultural sector, encourage sustainable economic growth, and improve the welfare of farming communities (Prayoga, 2017).

## Literature Review

In the business world, agribusiness management has a very broad meaning and several experts have different views. However, conceptually, agribusiness management is an activity of procurement, distribution and marketing of various agricultural and agrobusiness products (Rahim & Hastuti, 2005). Management science has an important role in agribusiness as a means of forming agribusiness planning that is more structured and well organized. Maulidah (2012) explains that agribusiness management is a form of integrated business activity which includes farming, food processing, facilities and various infrastructure for agricultural production, transportation, trade and also food stability and other activities, including the distribution of materials, food and dietary fiber to consumers.

Faqih (2010) explains that agribusiness is all activities carried out starting from the procurement process, distribution, implementation, to the marketing process of products obtained from farming or agrobusiness activities which are mutually linked to one another. Sjarkowi & Sufri (2004) in their book explain that the definition of agribusiness is all businesses that are closely related to agricultural production activities which include agricultural input companies and/or production efforts themselves as well as the management process of agricultural products. That means, agribusiness is an economic perspective for food providers in a country.

Agribusiness management involves a variety of functions that adapt to the unique needs of each agricultural enterprise. One of the main tasks is to manage and distribute production facilities such as land, capital, labor and technology efficiently (Primyastanto, 2011). Selection of appropriate production facilities, efficient resource allocation, and supply chain integration are the focus in this function. Another function involves cultivation activities, where agribusiness management must ensure that the cultivation process is carried out effectively and sustainably. This includes selecting appropriate varieties and implementing environmentally friendly agricultural practices (Asmarantaka et al, 2017). Furthermore, the process of processing goods and procuring materials for production is also a crucial part. Marketing of goods involves effective marketing planning and market understanding, while procurement deals with aspects of supply assurance.

## METHOD

Qualitative methods with a literature review approach are used in research regarding the application of information and communication technology in agribusiness management. The qualitative approach in this research aims to understand and develop knowledge through in-depth understanding (Yulianah, 2022). Qualitative research methodology is a process of investigation and understanding based on the approach used to research social and human problems. In this research, scientists present complex images, analyze words, provide in-depth reports, and understand the situations experienced (Moloeng, 2014). This qualitative approach utilizes library techniques to collect data that is relevant to the research object. Library research is an activity to collect, research and process library data without involving field research. Thus, this technique allows researchers to gain in-depth insight into talent management as a competitive advantage without having to conduct direct investigations in

the field. A qualitative approach and literature review methodology provides an appropriate framework for understanding the complexity and significance of talent management in the context of competitive advantage.

## RESULTS AND DISCUSSION

The agricultural industry plays a crucial role in the global economy with its contribution to food production, management of natural resources, and improvement of socio-economic welfare. However, the agricultural sector is faced with a number of challenges along with changing times, such as climate change, limited natural resources, and increasing consumer demand for food quality and safety. The role of technology in agribusiness development is very important. Increasingly sophisticated technology provides great opportunities to increase the efficiency and effectiveness of agricultural production, as well as enabling sustainable agricultural development. The following are forms of utilizing Information and Communication Technology in agribusiness management.

### **Management Information System (MIS)**

Management Information Systems (MIS) are the backbone for running agribusiness operations efficiently. Through the implementation of SIM, data collection, processing and analysis can be carried out in a coordinated and fast manner. With this system, agribusiness actors can easily manage their inventory, ensure the availability of necessary resources, and optimize their use. MIS also plays an important role in monitoring production, providing real-time information on agricultural yields, plant development and maintenance needs. This helps farmers to respond to changing field conditions more quickly and effectively.

In addition, SIM also provides the ability to conduct comprehensive operational performance analysis. The collected data can be processed into information that provides in-depth insight into process effectiveness, identification of potential improvements, and strategic decision making. By understanding operational performance in detail, agribusiness actors can increase efficiency, reduce waste and increase productivity. Overall, the implementation of MIS not only streamlines management processes, but also provides a solid foundation for sustainable growth in the agribusiness sector.

### **Mobile Based Agricultural Application**

Mobile applications have become an invaluable tool for farmers in supporting their agricultural activities. Through this application, farmers can easily and quickly access the latest weather information, providing a more accurate picture of the atmospheric conditions in their region. Accurate weather information is vital in agricultural planning, allowing farmers to organize planting, crop maintenance and harvest schedules more effectively. With a better understanding of weather conditions, farmers can take preventative action against potential extreme weather threats, such as floods or drought.

In addition, the mobile application also provides instant access to commodity price information, allowing farmers to follow market developments in real-time. This allows them to make smarter decisions in selling their agricultural produce, respond to market fluctuations, and plan more effective marketing strategies. Apart from that, this application also presents cultivation techniques and best practices that can help farmers increase their

agricultural yields. In this way, mobile applications are not only information tools, but also strategic partners in helping farmers optimize their production and make smarter decisions for the sustainability of their agricultural businesses.

### **Agricultural E-commerce**

E-commerce platforms have changed the landscape of trade between farmers and consumers and other businesses in the agricultural sector. With this platform, farmers can directly interact with consumers without intermediaries, creating wider and more open market access. Farmers now have the opportunity to display their agricultural products online, reaching consumers in various regions without being limited by geographic boundaries. This not only benefits farmers in expanding their market share, but also gives consumers access to a wide selection of fresh, quality products.

Additionally, the use of e-commerce platforms helps farmers get fairer prices for their products. By connecting directly with consumers, farmers can eliminate several layers of middlemen that may exist in traditional distribution chains. This allows them to earn better profit margins, while consumers can also enjoy more competitive prices. E-commerce platforms bring multiple benefits, not only in terms of expanding market reach, but also in creating a fairer and more sustainable trading environment for players in the agricultural sector.

### **Weather Monitoring and Prediction System**

Accurate weather information has a central role in successful agricultural management. Without a good understanding of weather conditions, farmers find it difficult to plan agricultural activities, such as planting, maintaining crops, and harvesting. Therefore, weather monitoring and prediction systems are key in supporting strategic decisions in agriculture. Using sensor technology and satellite data, this system provides real-time information that is essential for understanding weather variability at local and regional levels. This allows farmers to respond to weather changes more quickly and accurately, reducing the risks associated with extreme weather, such as floods, drought or pest attacks that may occur due to changing weather conditions.

Sensor technology and satellite data play a crucial role in improving the accuracy of weather monitoring. Sensors can measure temperature, humidity and air pressure with a high degree of accuracy, while satellite data provides a broad and in-depth picture of weather patterns and climate change. The combination of these two technologies provides a solid foundation for more accurate weather predictions, assisting farmers in long-term planning, rapid adjustment to sudden weather changes, and optimizing agricultural practices to suit ongoing environmental conditions. Thus, weather monitoring and prediction systems play a crucial role in sustainable agricultural management.

### **Radio Frequency Identification (RFID)**

The application of Radio Frequency Identification (RFID) technology to livestock and agricultural products has brought positive changes in inventory management in the agricultural sector. RFID allows farmers to easily track and manage information related to livestock and agricultural products efficiently. Every livestock animal or agricultural product equipped with an RFID tag can be uniquely identified via radio frequency signals. This

makes it easier to record inventory data, including information on the health, origin and movement of livestock or agricultural products.

Furthermore, RFID also contributes significantly to improving food safety. With precision tracking capabilities, farmers can quickly determine the source of the problem if there are health or safety issues with their agricultural products. In the case of contamination or disease, RFID enables rapid identification and recall of affected products, preventing further spread and protecting consumers from health risks. Thus, the use of RFID in agricultural inventory management not only provides operational efficiency but also improves quality control and food safety. In an increasingly complex global context and high consumer demands for food safety, RFID technology has become an invaluable tool to support the sustainability and integrity of agricultural supply chains.

### **Internet of Things (IoT) in Agriculture**

Internet of Things (IoT) has brought a revolution in the agricultural sector by enabling the use of sensors to collect data from various important aspects. With sensors connected to IoT devices, farmers can real-time monitor critical variables such as temperature, soil moisture and water quality on their farms. The resulting information provides a deep understanding of the environmental conditions in which crops grow, allowing farmers to respond to instantaneous changes in conditions.

Data collected by IoT sensors forms the basis for smarter decision making in agriculture. For example, farmers can adjust watering schedules based on measured soil moisture levels, optimizing water use. In addition, temperature monitoring can help identify the risk of pest or disease attacks on plants. By understanding the variability of environmental conditions in detail, farmers can develop more efficient farming strategies, increase crop yields and reduce negative impacts on the environment. The application of IoT in agriculture not only increases productivity and efficiency, but also opens up opportunities for further innovation. The integration of these sensors into agricultural management systems provides a strong foundation for the development of smart farming that uses data to provide more precise and sustainable solutions.

### **Drone Technology**

The use of drones in monitoring agricultural land has opened up new opportunities to obtain more comprehensive and accurate information. Drones enable monitoring from high altitudes, providing a broader picture of farmland. With camera technology installed on drones, farmers can obtain highly detailed visual data, enabling crop mapping with a high level of detail. This provides significant advantages in identifying potential problems or weaknesses in the agricultural field.

Apart from that, drones also help in identifying pests and diseases as well as monitoring plant growth. With the ability to perform multispectral scanning, drones can capture light spectra that are invisible to the human eye. This allows farmers to identify areas infested with pests or diseases, as well as monitor plant health conditions more accurately. This more intensive monitoring allows for rapid response to problems that may arise, helping to reduce crop losses and improve operational efficiency.

## Supply and Supply Chain Monitoring System

Information and Communication Technology (ICT) has an integral role in facilitating supply chain monitoring and management in the agricultural sector. From production to distribution, ICT enables better integration and efficient management. For example, an integrated information system can optimize production scheduling based on market demand, ensuring production meets existing needs. Additionally, ICT enables real-time monitoring of the state of inventories, enabling farmers and producers to identify needs and manage stocks more intelligently.

Furthermore, ICT also introduces innovation in distribution and supply chains. The use of technology such as automated tracking and inventory management systems can reduce waste and increase logistics efficiency. With accurate monitoring, manufacturers can manage their inventory more effectively, avoiding overstocks or shortages that can result in waste or missed market opportunities. In addition, ICT allows real-time monitoring of product quality and safety, ensuring that products delivered to consumers meet established standards.

The use of various technologies in agribusiness management not only reflects the digital revolution in the agricultural sector but is also a major driver in increasing productivity and sustainability. Through the application of information technology, accurate weather monitoring, the use of drones, and various other innovations, the agribusiness sector is able to optimize resource management, reduce waste, and provide smarter solutions in facing dynamic challenges. With a connected and integrated approach, players in the industry can make more timely decisions, increase operational efficiency, and overall, achieve higher levels of sustainability in meeting evolving market demands. The use of technology in agribusiness management is not just an evolution, but a transformation that marks a bright and competitive future for the agricultural sector.

## CONCLUSION

Technology has a very important role in advancing the agribusiness sector. The application of information technology such as Management Information Systems (MIS) and mobile applications helps in monitoring, inventory management and better decision making for farmers. The use of the Internet of Things (IoT) and sensors supports the collection of accurate data regarding weather, soil and water, enabling more efficient and sustainable agriculture. RFID and drone technology makes it easier to track inventory and monitor land, while e-commerce platforms open wider market access for farmers. Weather monitoring and prediction systems and the use of technology in supply and distribution chains reduce waste, increase efficiency and ensure the safety of agricultural products. All these technologies, when applied in an integrated manner, help increase productivity, optimize resource management, and provide effective solutions in overall agribusiness management. This digital transformation not only modernizes the agricultural sector, but also opens up new opportunities and creates an ecosystem that is more adaptive to climate change, market needs and environmental challenges. Overall, the use of technology in agribusiness

is the key to achieving sustainability, food security and increasing welfare in agricultural communities.

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