

The Pivotal Role of Technopreneurship in Advancing Local Economic Development: A Comprehensive Literature Review on the Integration of Digitalization in Micro Agricultural Enterprises in Jambi (2020-2024)

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ABSTRACT

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This article discusses the contribution of technopreneurship in building the local economy through a literature study on digitalization in micro enterprises in the agricultural sector in Jambi during 2020–2024. In practice, micro business actors still face a number of obstacles such as market limitations, low productivity, and lack of use of technology. The presence of technopreneurship brings a modern entrepreneurial approach based on technology, which not only digitizes business processes, but also increases the competitiveness of agricultural products through the use of digital platforms. Through a qualitative-descriptive approach that refers to academic literature, policy reports, and the latest data, this study finds that digital transformation facilitated by technopreneurship plays an important role in increasing the output, distribution, and income of microfarmers in Jambi. However, challenges in the form of infrastructure, limited digital literacy, and access to financing are still the main obstacles. Therefore, collaborative strategies from various stakeholders are needed so that the benefits of technopreneurship for local economic development can be optimized.

1. Introduction

The agricultural sector has a major contribution in supporting the regional economic structure in Indonesia, including in Jambi Province. In the second quarter of 2024, the agriculture, forestry, and fisheries sectors were recorded to contribute 34.10% to the Jambi Province's Gross Regional Domestic Product (GDP) (Antaranews Jambi, 2024). Of these sectors, palm oil commodities are the most dominant, with more than 271,702 individual agricultural business units (UTPs) involved in its cultivation out of a total of 565,489 UTPs recorded in the province (Antaranews Jambi, 2024). These figures show that agriculture is not only the main source of livelihood, but also the driving force of local economic development.

However, micro-scale farmers in Jambi still face various structural obstacles such as limited market access, low production efficiency, and lack of technology utilization. These limitations have an impact on income stagnation and low competitiveness of local agricultural products. It is in this context that the technopreneurship approach or technology-based entrepreneurship is beginning to be considered as a strategic way to transform traditional agricultural practices towards a more modern and adaptive direction to the digital era (Siregar & Sipayung, 2021).

Since 2020, there have been a number of digitalization initiatives driven by Jambi academics and youth, with support from the local government. One of the important innovations is the launch of the Digisawit application by the Faculty of Agriculture, University of Jambi in 2023. This application is designed to facilitate real-time management of oil palm plantations, record agricultural activities, ensure traceability, and help farmers obtain sustainable certification,

which is the main requirement to be able to penetrate the European export market (Antaranews Jambi, 2023).

According to Drucker (1985), technopreneurship is a form of entrepreneurship that uses technological innovation as the core of the value creation process. In the micro-agriculture sector, this approach includes the use of mobile applications, Internet of Things (IoT)-based sensor systems, as well as digital marketing platforms that can improve operational efficiency and open up wider market access. This is in line with the findings of Fitriani and Ningsih (2022), who said that agricultural digitalization is able to reduce transaction costs, improve yield quality, and strengthen farmers' bargaining positions in the market.

Recent studies show that the application of information and communication technology (ICT) in agricultural practices has resulted in increased productivity and efficiency, especially in regions that have adequate digital infrastructure support. However, in various local contexts such as Jambi, obstacles such as low digital literacy of farmers, limited internet connectivity, and lack of access to capital, are still the main challenges in this transformation process (Arifianto, 2023, Wibowo, 2022). For example, in Indonesia, the use of drones and IoT-based sensors for the purpose of spraying crops or measuring soil moisture has begun to be introduced. However, the level of adoption of this technology is still limited to farmer groups that have external support or partnerships with educational institutions and the private sector (STEM.or.id, 2023). For micro business scales that generally have limited capital and human resources, a more inclusive approach strategy and based on local needs is needed.

In Jambi Province itself, the practice of technopreneurship can also be seen from the emergence of the Ciptani application in 2022, which was developed by local youth groups. This application has been used by around 300 farmers in Jambi City to digitally document planting, harvesting, and production data. More than that, Ciptani also built a network of partner stalls as marketing distribution points, with a target of covering 250 stalls, as well as providing business capital support of around IDR 1 million per partner to strengthen the sustainability of the system (Antaranews Jambi, 2022, University of Jambi, 2022).

In addition, technology-based innovations are also carried out by a research team from the Faculty of Agriculture, University of Jambi who developed a Smart Planting System for organic vegetable cultivation. This technology uses sensors to detect temperature, humidity, and light intensity to automate the watering and fertilization process (Antaranews Jambi, 2023b). Another initiative is a solar energy-based Smart Farming system (PLTS) developed by UNJA Robotics MSMEs and implemented in Bakung Jaya Village. This system allows farmers to operate irrigation and nutrient distribution automatically without relying on conventional electricity supply (University of Jambi, 2023).

Not only in terms of technology, human resource development is also the main focus. In early 2023, the Ministry of Agriculture through BPPSDMP held a digital technology-based entrepreneurship training for millennial farmers in Jambi. This training aims to improve the competence of young farmers in utilizing information technology, especially in digital marketing and agricultural business management (BPPSDMP, 2023). This kind of training is an important foundation in creating a sustainable local technopreneurship ecosystem.

Departing from this background, this study aims to examine the contribution of technopreneurship to local economic development in Jambi Province, with a focus on the digitalization of micro businesses in the agricultural sector in the period 2020–2024. More specifically, this study has four main objectives, namely:

1. Examine the development of digital technology adoption (such as applications, IoT, and digital platforms) in agricultural micro-enterprises in Jambi.
2. Analyze the impact of digitalization on the productivity, distribution efficiency, and income of small-scale farmers.
3. Identify key challenges in the digitalization process, including limitations in digital literacy, infrastructure, and access to capital.
4. Provide collaboration-based policy recommendations between the government, the private sector, academia, and the technopreneur community to strengthen the digital agriculture ecosystem at the local level.

This research is expected to be able to make a scientific and practical contribution in an effort to encourage digital transformation in the micro agriculture sector. Given that this sector is not only economically strategic, but also plays a major role in absorbing labor and supporting regional food security, the development of local-based technopreneurship is an increasingly urgent need.

2. Research Methods

This study uses a qualitative-descriptive approach with the literature review method as the main framework. The purpose of this method is to evaluate and synthesize various relevant secondary sources related to the implementation of technopreneurship and digitalization of agricultural micro enterprises in Jambi Province during the 2020–2024 period.

2.1 Types of Literature Studies

This research is a study of narrative literature, which aims to interpret trends, challenges, and contributions of technopreneurship in the context of local economic development. The study combines academic literature, policy reports, official news, as well as empirical data from government agencies and universities.

2.2 Data Sources

Secondary data was collected from a variety of sources, including:

- a. Articles in national and international scientific journals
- b. Research and service reports from universities (especially the University of Jambi)
- c. News releases from trusted media such as Antaranews Jambi
- d. Policy reports from relevant agencies (e.g. Ministry of Agriculture, BPPSDMP)
- e. Statistical data from the Central Statistics Agency (BPS), the Agriculture Office, and other local agencies

2.3 Inclusion and Exclusion Criteria

Inclusion:

- a. Publications published between 2020 and 2024
- b. Focus on micro enterprises, digitalization, agriculture, or technopreneurship
- c. Studies or reports in the context of Jambi Province

Exclusion:

- a. Articles that only discuss large-scale agriculture or industry
- b. Unverified or irrelevant sources to the focus of technopreneurship

2.4 Analytical Techniques

The analysis was carried out by the thematic analysis method, where the collected literature was categorized into the following main themes:

- a. Form of digital technology adoption in agricultural micro enterprises
- b. The impact of technopreneurship on farmers' productivity and income

- c. The main obstacles faced by microfarmers in the digitalization process
- d. Policy recommendations and collaboration between stakeholders

The results of the synthesis are presented narratively and contextually to describe local dynamics and provide insight for the development of technology-based regional economic development strategies.

3. Discussion

3.1 Development of Digitalization Adoption in Agricultural Micro Enterprises in Jambi

In the period 2020–2024, there are several important initiatives that mark the development of technopreneurship in Jambi's micro-agriculture sector. Among them:

- a. **The Digisawit application (2023)** was developed by the Faculty of Agriculture, University of Jambi. This application facilitates the recording of plantation activities, yield tracking, and supports the sustainability certification process for palm oil commodities.
- b. **The Ciptani platform (2022)** is used by around 300 farmers for digital documentation of agricultural production, distribution of crops through a network of partner stalls, and the provision of micro capital support.
- c. **The Smart Planting System and Smart Farming of PLTS**, developed by the UNJA academic community, enable the automation of irrigation, fertilization, and monitoring of gardens by utilizing solar energy.

These developments show a positive trend in the introduction and application of digital technologies, especially through collaboration between academics and local communities.

3.2 The Impact of Digitalization on Farmers' Productivity and Income

Digital transformation in the microagriculture sector has proven to provide a number of tangible benefits:

- a. **Increased efficiency** in the production process and recording of agricultural products, which were previously done manually.
- b. **Wider market access**, through the use of digital platforms for product sales and promotion.
- c. **An increase in** the income of partner farmers (for example in the Ciptani program), thanks to the ease of distribution and integration of marketing to partner stalls.
- d. **Increased** competitiveness, especially in export commodities such as sustainable palm oil supported by the traceability system from Digisawit.

Although quantitative data are still limited, findings from local reports and official news show that digitalization has a positive impact on smallholder output and added value.

3.3 Challenges in the Digitalization Process

While technopreneurship initiatives continue to grow, a number of structural barriers remain major obstacles:

- a. **Low digital literacy**, especially among elderly farmers and those who have never come into contact with technology before.
- b. **Limited digital infrastructure**, such as an uneven internet network in rural areas of Jambi.
- c. **Limited access to capital**, where most farmers have no collateral or are not reached by digital credit schemes.
- d. **Lack of ongoing mentoring**, which leads to some programs only being active in the early stages without long-term support.

This condition underscores the importance of an inclusive approach in building an agricultural digital ecosystem, taking into account the local context and capacity of farmers.

3.4 Collaborative Strategies in Strengthening the Technopreneurship Ecosystem

Based on the literature study analyzed, the formation of a sustainable technopreneurship ecosystem in Jambi requires:

- a. **Multi-sector collaboration**: between the government, universities, the private sector (agritech startups), and the farming community.
- b. **Public policy support**: in the form of fiscal incentives, inclusive financing, and rural digital infrastructure investments.
- c. **Increasing human resource capacity**: through digital training for millennial farmers and technology-based entrepreneurship mentoring.
- d. **Scalability of local models** : such as Ciptani and Digisawit, so that they can be replicated in other districts in Jambi Province.

With a collaborative approach, technopreneurship can be a lever for local economic growth based on the advantages of the micro agriculture sector.

4. Conclusion

This research shows that technopreneurship has a significant contribution in encouraging local economic development in Jambi Province, especially through the digitalization of micro businesses in the agricultural sector. Various initiatives such as *the Digisawit*, *Ciptani* applications, as well as *Smart Farming* and *Smart Planting System* technology are concrete evidence that the adoption of technology can improve production efficiency, expand market access, and encourage an increase in smallholder income.

However, these benefits have not been felt equally by all micro business actors. Major obstacles such as low digital literacy, limited infrastructure, and minimal access to financing are still challenges that need to be overcome. Therefore, a collaborative approach involving governments, academics, business actors, and local communities is needed to create an inclusive and sustainable technopreneurship ecosystem.

By building cross-sector support and strengthening the capacity of human resources, technopreneurship can become the engine of the transformation of traditional agriculture towards technology-based modern agriculture. This not only has an impact on improving the welfare of farmers, but also strengthens the local economic structure that is more adaptive and competitive in the digital era.

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