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Research Paper

The Influence of Technological Determinism through Social Media on Farmers' Adoption of Agricultural Innovations

Mariewentty Clarmel Ruhunlela*, Mariko Rizkiansyah
Binus University, Indonesia

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Abstract

The agricultural sector has entered the era of Industrial Revolution 4.0, marked by the integration of internet-based technologies such as IoT (Internet of Things) devices and precision farming tools into agricultural practices. This transition offers significant opportunities to enhance community creativity and engagement. This study focuses on Saparua Island in Central Maluku Regency, examining how farmers perceive technological determinism through social media and its impact on agricultural productivity. A qualitative approach was used, employing reception analysis with an encoding-decoding model. Twenty-five respondents were categorized into three positions: dominant, negotiated, and oppositional. The findings reveal diverse public responses to the program "The Future of Farming," which was presented in six segments. The dominant position reflects a positive reception, with participants viewing technology as a beneficial innovation that increases agricultural output, especially for island farmers. Respondents in the negotiated position exhibit mixed reactions, recognizing potential benefits while expressing concerns about the scale of anticipated changes. In the oppositional position, participants resist technological integration, favouring traditional farming methods due to a strong attachment to conventional practices. This study highlights the varied perspectives on technological advancements in agriculture and underscores the importance of addressing these viewpoints to promote a balanced development approach.

Keywords *Agricultural Productivity; Technological Determinism; Reception Analysis; IoT Devices; Precision Farming, Social Media; Agricultural Innovation*

INTRODUCTION

The agricultural sector has become increasingly influenced by advancements in information and communication technology, especially as the world moves further into the era of Industrial Revolution 4.0. This era is characterized by the integration of internet-based technologies, such as IoT (Internet of Things) devices and precision farming tools, which hold the potential to transform traditional agricultural practices. These technological advancements present valuable opportunities for farmers to enhance productivity, broaden market reach, and improve community engagement in the agricultural sector (Nainggolan & Riyanto, 2019).

In recent years, the rise of social media has had a significant impact on various sectors, including agriculture, where it plays an essential role in information dissemination and marketing. Social media has become a platform for farmers and agricultural stakeholders to share information, promote their products, and access new online markets. Indonesia has witnessed substantial growth in internet and social media usage, with a penetration rate of 77.02% of its population, reaching 191.4 million users as of January 2022 (Asosiasi Penyelenggara Jasa Internet Indonesia, 2021). Social media provides an accessible and efficient avenue for farmers to connect directly with consumers, thereby bypassing traditional supply chains, which is particularly beneficial in remote and rural areas.

Despite the potential of these digital tools, challenges persist in adopting technology and social media within the agricultural sector, particularly among small-scale farmers. Many farmers face obstacles such as limited access to information technology, lack of digital literacy, and a low interest in utilizing online platforms. As a result, they are often left out of online marketing activities that could significantly expand their market reach and increase their profitability (Oktarina et al., 2019). This study

Corresponding author's email: mariewentty.ruhunlela@binus.ac.id

seeks to address this gap by exploring how farmers can leverage social media for online marketing activities and how they perceive the shift towards digital platforms in agriculture.

The focus of this research is on online marketing activities using social networks within the agricultural sector. By examining the perspectives of farmers on Saparua Island in Central Maluku, this study aims to analyze how social media and online marketing can influence agricultural productivity and economic growth in rural settings. Although Saparua Island serves as the case study location, this research provides insights relevant to broader agricultural contexts where small-scale farmers seek to adopt digital tools for market expansion.

This study contributes to the literature by highlighting the importance of understanding farmers' attitudes toward digital marketing in agriculture, especially in areas where conventional farming practices dominate. The novelty of this research lies in its focus on the reception of social media as a tool for agricultural marketing, specifically analyzing farmers' reactions to the YouTube video "The Future of Farming" using a reception analysis approach with an encoding-decoding model. The study identifies varying degrees of acceptance, concerns, and resistance among farmers towards social media marketing, filling a research gap in understanding digital adoption in traditional agricultural communities.

LITERATURE REVIEW

Diffusion of Innovation

The Diffusion of Innovation theory, as introduced by Rogers, provides a framework for understanding how new ideas and technologies spread within a social system. According to Rogers (cited in Schiffman, Kanuk, & Wisenblit, 2015), diffusion is a process in which innovation is communicated through specific channels over time among members of a social system. This process represents a form of social change, altering the structure and functionality of societal systems as innovations are adopted. The diffusion of innovation typically involves various communication channels, including mass media, advertisements, consultations, and informal social contacts. The effectiveness of each channel can differ across stages and functional departments, reflecting the complexity of innovation adoption (Fatmawati, 2018). Rogers identified four essential elements in the diffusion process: innovation, communication channels, time, and the social system (Rusmiarti, 2016).

Innovation refers to new ideas, practices, or objects perceived as novel by individuals or groups (Sahin, 2006). Communication channels play a crucial role in spreading these innovations, where the choice of channel depends on the intended audience—mass media for wider public reach and personal channels for individual engagement (Deshpande, 1988). The time element refers to the period it takes from the introduction of innovation until adoption decisions are made. Finally, the social system encompasses the interconnected social units that adopt or reject the innovation, shaped by shared goals and functions (Beever, 2017).

Technological Determinism

Technological Determinism is another relevant theory that examines the influence of technology on societal change. According to Meisyaroh (2016), technological determinism suggests that past technological developments shape present and future outcomes, often affecting people subconsciously. This concept emphasizes the governing role of technology in shaping society and interpersonal communication, highlighting that technology can control or guide human activities and thinking (Febriana, 2018). McLuhan (1962) introduced this theory in his work The Gutenberg Galaxy is one of the foundational works explaining how shifts in communication technologies reshape patterns of human cognition and social organization. Where he argued that shifts in communication technologies influence human existence and societal structures (Aunillah, 2020).

Daniel Chandler expanded on McLuhan's ideas, identifying four basic assumptions associated

with technological determinism. The first assumption, reductionism, proposes that technology gradually diminishes certain cultural values (Santoso et al., 2019). The second assumption, monism, views technological determinism as a simplification mechanism that has both positive and negative impacts. Neutralization, the third assumption, suggests that technology is inherently neutral, with its effects dependent on the user's intent and application. Finally, the technological imperative implies that technological progress is inevitable, evolving alongside human culture and shaping it in irreversible ways. In its development, technological determinism manifests in three forms: normative, where technology drives efficiency and productivity over ethical or political concerns; logical, where new technology reshapes social and cultural practices, including communication; and consequential, which highlights unintended effects, such as environmental issues and lifestyle shifts linked to technological advancements (Wright, 2015; Meisyaroh, 2016).

Technology For Agriculture

In the context of Technology for Agriculture, advancements in Information and Communication Technology (ICT) have significantly improved agricultural practices. The integration of ICT in agriculture allows farmers and stakeholders to plan better, monitor, and manage their land (Engel & Suakanto, 2016). One prominent innovation in this domain is the Internet of Things (IoT), which connects a network of sensors to the internet, enabling data-driven farming. IoT applications in agriculture—commonly known as smart farming or precision agriculture—facilitate automation and high-precision monitoring, offering substantial improvements in both productivity and quality compared to traditional methods (Pillai & Sivathanu, 2020; Ayudyana & Asrizal, 2019).

Social media has emerged as a crucial tool in marketing agricultural products, helping farmers expand their market reach and enhance engagement with consumers. Various studies have highlighted the potential of social media platforms to enable direct communication between farmers and consumers, thereby bypassing intermediaries and thus increasing profitability. Social media facilitates the sharing of real-time information on product availability, quality, and pricing, which empowers farmers to respond to market demands more effectively. Additionally, it helps build consumer trust and strengthens customer relationships, making it an invaluable resource in modern agricultural marketing strategies. Overall, the literature underscores the transformative role of ICT and social media in enhancing agricultural productivity and accessibility in today's digital age.

RESEARCH METHOD

This study employs qualitative methods, which are used to examine the natural objects of researchers as a key instrument (Prasanti, 2018). Research uses open interviews to examine and understand the behavior, views, feelings, and attitudes of individuals or groups of people. Therefore, in this study, the authors conducted in-depth open interviews to understand how the texts and signs contained in the media were interpreted in such a way. In qualitative research, the reception analysis method utilizes Stuart Hall's encoding–decoding model. There are three positions for the audience, namely the dominant position, the negotiated position, and the oppositional position.

The reception analysis method allows the listener to become an active participant in explaining the meaning of the text by reading. What the media displays will be understood as a process that makes sense and is constructed through reading images and texts (Hardyanti, 2019).

After the video "The Future of Farming" was created and released on YouTube on May 18, 2017, it has garnered 1,799,846 views to date. Viewers engage with the media to access and interpret the video's messages. The role of TDC (2017), the video creator, as a sender of messages

becomes less pronounced in the communication process; instead, the language and visual elements of the video largely influence audience acceptance.

In qualitative research, the research subject becomes a respondent who will provide various information needed during the research process (Sondak, Taroreh, & Uhing, 2019). The respondents in this study are the people of Saparua Island who work as farmers. Saparua farmers who participated in this study amounted to 25 people (30% of the total 85 farmers). This study was conducted from May 2021 to August 2021.

The reception analysis method involved several steps. First, a preferred reading was conducted, with transcripts of interviews analyzed and grouped into three categories of meaning: dominant reading, negotiated reading, and oppositional reading. This classification aimed to strengthen data collection by directly engaging with respondents, gathering comprehensive and in-depth insights into their interpretations of "The Future of Farming."

This is done to strengthen data collection with respondents directly and collect complete and in-depth data to report on the utilization of respondents' interpretations of the video content titled "the Feature of Farming". The following is the classification of "the Feature of Farming" based on the preferred reading, which is divided into three positions as follows :

1. Dominant Position (approve)
2. Negotiating Position (understanding and having alternative views)
3. Oppositional Position (disapproval)

With the meaning of each scene as follows :

1. Scene 1, which has the meaning that technological innovation has a major impact on the agricultural sector in helping to provide food that is experiencing a surge in productivity every year.
2. Scene 2, which has the meaning of technology in agriculture, that technology provides an increase in time efficiency at the level of harvest and post-harvest.
3. Scene 3, which has the meaning of technology in agriculture, is able to suppress the use of chemicals that aim to kill pests and weeds in plants.
4. Scene 4, which has the meaning of technology in agriculture, creates smart agriculture using IoT (Internet of Things) systems. By using drones to satellites to collect data from sowing seeds to harvesting.
5. Scene 5, which has the meaning of technology in agriculture, suggests that there is a role to improve the structure of the communication network that occurs between farmers.
6. Scene 6, which has the meaning of technology in agriculture, plays an important role in increasing agricultural productivity, given that extensification in the agricultural sector is difficult to apply in Indonesia.

Interview Protocol

The open interviews conducted for this study were designed to facilitate an in-depth exploration of respondents' interpretations. Each interview lasted approximately 45-60 minutes and included a series of semi-structured questions tailored to elicit detailed responses. The questions centered on respondents' views of the video content, their agricultural practices, and their perceptions of the impact of technology on their work. This approach allowed for a rich, nuanced understanding of how farmers relate to the themes presented in "The Future of Farming."

Application of Hall's Model

To analyze the data effectively, the researcher applied Stuart Hall's encoding-decoding model through a systematic examination of the interview transcripts. Each respondent's interpretation

was categorized based on their expressed understanding of the video. This categorization revealed three distinct positions: the dominant position, which reflected general agreement with the video's messages; the negotiated position, which illustrated more nuanced interpretations; and the oppositional position, which highlighted dissenting views regarding the content. This framework provided valuable insights into how different audience members engage with media texts.

Participant Selection

The selection of participants was a critical aspect of the study, ensuring that the findings would be representative of the diverse experiences within the farming community on Saparua Island. A purposive sampling method was employed to select 25 farmers based on specific criteria, including age, type of crops cultivated, and varying levels of technology adoption in their farming practices. This deliberate selection process aimed to capture a wide range of perspectives and experiences, enhancing the study's depth and relevance.

Media Environment Context

While participants interpreted the video, it is essential to note the context in which they viewed it. Most respondents watched the video individually at home, while some viewed it in small community groups during informal gatherings. This context may influence their interpretations and discussions.

Assessment of Impact

To further understand the video's impact on viewers, follow-up interviews were conducted one month after the initial viewing. These interviews aimed to capture any changes in perceptions, practices, or attitudes toward agricultural technology that may have been prompted by the video. This longitudinal approach allowed for an assessment of the video's lasting effects on the audience, thereby enriching the overall findings of the research.

Ethical Considerations

Ethical considerations were central to the conduct of this research. Informed consent was obtained from all participants prior to the interviews, ensuring they were fully aware of the study's purpose and their rights. Confidentiality was strictly maintained by anonymizing responses and securely storing all data. Participants were also informed of their right to withdraw from the study at any time without consequence. This commitment to ethical standards fostered trust and transparency throughout the research process.

FINDINGS AND DISCUSSION

Based on research conducted on 25 farmers in Saparua Village, the results of data analysis were adjusted to three positions according to Stuart Hall, namely: Dominant Position, Negotiated Position and Opposite Position as follows (Table 1).

Table 1. The Results of The Analysis of Respondents in 3 Positions in Each Scene in The YouTube Video "The Future of Agriculture"

Respondent	Dominant Position						Negotiated Position						Oppositional Position					
	1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6
1	✓	✓			✓				✓	✓		✓						
2	✓	✓	✓	✓	✓	✓												
3	✓				✓	✓				✓				✓	✓			
4	✓					✓		✓	✓	✓	✓							
5	✓		✓		✓			✓		✓		✓						
6	✓	✓			✓				✓			✓				✓		

Respondent	Dominant Position						Negotiated Position						Oppositional Position					
	1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6
7	✓		✓	✓				✓			✓	✓						
8	✓	✓			✓				✓	✓		✓						
9	✓	✓				✓			✓	✓	✓							
10	✓	✓	✓		✓	✓				✓								
11	✓	✓			✓				✓	✓		✓						
12	✓	✓	✓	✓	✓	✓												
13	✓				✓	✓				✓				✓	✓			
14	✓					✓		✓	✓	✓	✓							
15	✓		✓		✓			✓		✓		✓						
16	✓	✓			✓				✓			✓				✓		
17	✓		✓	✓				✓			✓	✓						
18	✓	✓			✓				✓	✓		✓						
19	✓	✓				✓			✓	✓	✓							
20	✓	✓	✓		✓	✓				✓								
21	✓		✓		✓			✓		✓		✓						
22	✓	✓			✓				✓			✓				✓		
23	✓		✓	✓				✓			✓	✓						
24	✓	✓			✓				✓	✓		✓						
25	✓	✓				✓			✓	✓	✓							

1. Dominant Position

   Table 1 shows that after watching the "Future of Farming video", all respondents (100%) agree that technological innovation has a major impact on the agricultural sector in helping to provide food, which experiences a surge in productivity every year. 15 respondents or 60% of the respondents agreed that technology provides improvements in time efficiency at the harvest and post-harvest levels. 40% of respondents (10 people) agreed that technology in agriculture is able to suppress the use of chemicals that aim to kill pests and weeds in plants. 5 respondents (20%) agree that technology in agriculture creates smart agriculture with IoT systems. 68% of respondents (17 people) agreed that technology in agriculture is able to improve the structure of communication networks that occur between farmers. Furthermore, 44% of respondents (11 people) agreed that technology in agriculture plays an important role in improving agricultural productivity, given that extensification in the agricultural sector is challenging to implement in Indonesia.

2. Negotiated Position

   In this type, 8 respondents or 32% of 25 respondents understand and have an alternative view that agricultural technology provides an increase in time efficiency at the harvest and post-harvest levels; in addition to playing a role in improving the structure of communication networks that occur between farmers. 13 respondents (52%) understand and have an alternative view that technology in agriculture is able to suppress the use of chemicals that aim to kill pests and weeds in plants. 68% of respondents (17 people) understand and have an alternative view that technology in agriculture creates smart agriculture with IoT systems. Furthermore, 56% of respondents or 14 people understand and have an alternative view that technology in agriculture plays an important role in increasing agricultural productivity, given that extensification in the agricultural sector is difficult to implement in Indonesia.

3. Oppositional Position

   In this position, only 8% (2 people) of the total respondents disagreed that agricultural technology provides an increase in time efficiency at the level of the harvest and post-harvest periods. In addition, 2 respondents also do not agree that agrarian technology is able to suppress the use of chemicals that aim to kill pests and weeds in plants. Furthermore, 12% of respondents (3 people) who disagree that agricultural technology is able to create smart

agriculture with IoT systems. In this case, by using drones to satellites to collect data from sowing seeds to harvesting.

Diffusion Of Innovation

To interpret innovation through social media, YouTube to farmers in Saparua, we use 4 main elements, according to Everett Rogers, used in the process of diffusion of innovation, namely.

1. Innovation

   Based on the analysis of interviews conducted, the majority of respondents strongly stated that technological innovation has a major impact on the agricultural sector. Various innovations make them interested in learning to adopt technology in line with current developments. Farmers in Saparua are generally receptive to agricultural innovations and recognize the benefits of modern technology in boosting productivity. Although they often learn independently, they appreciate technology that aligns with traditional practices. They make an effort to understand the technology on their own to avoid confusion when sophisticated tools are introduced for their land in the future.

   The farmers agree that the openness to technological innovation in the agricultural sector will help meet target needs in processing, so there will be no shortage of food stocks overall. These major changes in the agricultural sector are expected to help farmers' productivity in cultivating land and crops. Technology exists to make agricultural activities easier, keep practices up-to-date, and help farmers advance their knowledge.

   However, limited access to technology may affect their readiness to fully adopt these innovations, highlighting a gap between interest and practical application. Although the technology presented through platforms like YouTube is still far from the real condition of technology available in the Saparua Islands region, farmers remain hopeful for advancements.

2. Communication Channels

   Farmers on Saparua Island have high ambitions and expectations for making their agricultural land beneficial to communities beyond their region. They strive to produce high-quality crops with a high market value by utilizing limited resources, such as land processing technology, quality seeds, pest protection, and post-harvest management. Traditionally, their knowledge of effective agricultural systems has come from socialization and guidance from institutions like the Department of Agriculture and NGOs with relevant work programs.

   Since 2017, Saparua farmers have started using Facebook as a resource for information on agricultural issues, finding value in accounts that showcase advanced agrarian development models in other Indonesian regions like Java, Sumatra, and Sulawesi, as well as in international examples from countries such as the Netherlands, Australia, New Zealand, Brazil, Japan, and Thailand. Over the past two years, TikTok has also become an important channel for them to explore modern agricultural practices. They appreciate TikTok's short, information-dense, and music-infused format, which makes learning enjoyable and accessible.

   Increasingly, Saparua farmers rely on social media platforms like Facebook and TikTok to learn about agricultural advancements. The platforms provide a bridge to high-tech farming models from developed countries, contrasting with their limited formal agricultural education and positioning social media as an essential knowledge resource. Through this exposure, the concept of innovation becomes meaningful for Saparua farmers, facilitating their journey toward more modern farming practices.

3. Time Period
   The enthusiasm of Saparua farmers to find out information on agricultural development in their region is relatively high. The desire to build a good and structured agricultural system, starting from land processing to harvesting, as illustrated in the video, is increasing in line with the hope of producing high-quality agricultural products. The belief that having such technology in developing countries, as depicted in the video, will change the agricultural system on Saparua Island as soon as possible, if coupled with the ability and skills of every farmer to run it. Saparua farmers believe that farming on Saparua Island will change within a span of about 2-5 years, when such technology can be mastered and lived by them. They agree that technological innovation has a huge impact on the agricultural sector in an effort to meet the need for food.

4. Social System
   Farmers in Saparua Village are part of a tightly-knit social structure composed of familial and community groups, including semarga (extended families), mata rumah (lineage groups), church-based men's and women's groups, and PKK mothers' associations. While these groups serve distinct functions, they share a common goal of supporting community well-being. Decisions to adopt new technologies or innovations among farmers are often influenced by input and information from these social units. This collective decision-making process can lead to caution or even pessimism about acting as innovators, positioning Saparua farmers within the early and late majority categories of technology adopters. They prefer to observe the successes of others before committing to new practices, showing a reliance on proven outcomes and a cautious approach due to limited confidence in their skills, knowledge, and financial resources to acquire advanced technologies.
   Furthermore, in relation to the theory of technological determinism, Saparua farmers are well aware that technological changes from the past to the present have had a significant influence on people's lives.

5. Normative
   Saparua farmers realize that their lives also depend on technology. The growing technology will trigger the emergence of innovations that themselves urge them to follow the flow of development to become more modern. Farmers are very understanding if technology is created to facilitate their daily agricultural activities. Because basically, technology is the result of human work that is not biased from the point of view that sees it as an external aspect of human determination itself (Burgess, 2007).

6. Logical
   Considering the region's condition, land, skills, education, and simple technology, Saparua farmers recognize that they will certainly be transformed by technological changes and new innovations that appear in the agricultural system in which they are involved. All of them will tend to simplify their lives. It will also cause a shift in values, habits, ways of interacting, and ways of communicating, as well as the systems that exist in their lives, and, of course, will have an impact on social change that encompasses overall transformation. This is finally proven by the concept of Bimber (1990), who pointed out that the emergence of new technological applications and communication methods has changed human life (Bimber, 1990).

7. Consequences

Farmers recognize that the pursuit of a better life through the adoption of modern technology brings both opportunities and challenges. While technological advancements offer potential improvements in agricultural productivity and quality of life, they also come with significant considerations, such as environmental pollution, societal shifts, and lifestyle adjustments that may be costly. These changes require farmers to balance the perceived benefits of innovation with realistic concerns about sustainability and the preservation of traditional farming practices. This nuanced perspective reflects a cautious approach to technology adoption, where the impacts on both the environment and local culture are carefully weighed against the potential for progress.

The use of information technology is one of the efforts in developing agricultural technology innovation, enabling the production of agricultural system information in an area to be further enhanced in the process of receiving meaning. Based on the interviews obtained, it is evident that a process of ideation has produced a discourse on the future of agriculture, conveying a message that technology is revolutionizing the agricultural industry.

Considering Saparua's local cultural context, this study delves into how factors such as age, education, and farming experience shape technology adoption. Younger farmers, for instance, may show greater openness to technological change, whereas older farmers might prioritize preserving traditional methods. Further research on these demographic influences would add depth to understanding the diverse responses within the farming community.

Direct quotes from participants would enrich the discussion, show casing alternative perspectives and revealing themes of negotiation between traditional practices and technological innovation. Furthermore, a comparative analysis with similar studies from other regions could highlight cultural nuances in the adoption of technology.

In this study, it was found that the informants involved generally understood that the video "The Future of Farming" contains a message that technological changes that occur continue to permeate all fields, including agriculture. This is shown not only by technology dominating humans, but technology itself helps to increase crop yields, which have been targeted to increase every year. Informants view this video as a good starting point for introducing better technology in agriculture in Indonesia. In addition, the video left a positive impression on experienced informants. According to them, the sophistication of technology that occurs brings big changes for farmers and becomes a breath of fresh air for Island farmers because this new thing needs to be introduced more specifically for those who have large amounts of land. They explained that the video fosters a view of him where the rapid movement of technology certainly makes them need to move, and also to learn to be modern farmers.

CONCLUSIONS

The findings reveal that the 25 farmers who watched the Future of Farming video generally understood and positively received the message about technological advancements in agriculture. The majority agreed with the concept of integrating improved technology into farming practices, recognizing its potential to streamline processes and increase productivity. However, a sense of cautious optimism remains, as many farmers expressed concerns about their limited skills, knowledge, and financial capacity to adopt these technologies. The perceived high costs and the need for specialized training present significant barriers to adoption. Despite these challenges, the study uncovers a growing awareness and interest among Saparua farmers in modernizing their agricultural practices, indicating a shift in attitudes towards innovation. These insights underline a pivotal opportunity: to support local farmers in bridging the gap between interest and practical application by enhancing access to training, resources, and financial assistance. This study thus

contributes to a deeper understanding of how rural farmers interpret and engage with agricultural innovations presented through digital media, such as YouTube. It highlights the critical role of contextualized support in fostering technological adoption in rural areas, suggesting that efforts to introduce agricultural technology should be coupled with localized education and financing options. Ultimately, the study reflects the complex interplay between enthusiasm for progress and realistic concerns, positioning these farmers as potential early adopters given the right resources, rather than mere recipients of technology.

LIMITATION AND FURTHER RESEARCH

This study provides valuable insights into how farmers on Saparua Island interpret technological innovation in agriculture through social media content; however, several limitations should be acknowledged. First, the qualitative approach and relatively small number of participants (25 farmers) limit the generalizability of the findings. Although the purposive sampling method helped capture diverse perspectives based on age, crop type, and technological exposure, the sample may not fully represent all farmers across Saparua or other regions in Central Maluku. Future studies could expand the respondent base to include larger populations and conduct comparative research across multiple islands or districts to deepen understanding of regional variations.

Second, this study relied heavily on self-reported interview data, which may be influenced by social desirability bias or respondents' attempts to provide what they perceive as "ideal" answers. Some farmers may have expressed more optimism or caution than they actually practice in daily life. Future research could combine qualitative interviews with observational methods, such as field visits, agricultural technology demonstrations, or digital behavior tracking, to strengthen the accuracy of the findings.

Third, the study focused on a single media artifact—the YouTube video "The Future of Farming." While this video provides a rich representation of technological innovation, farmers today consume agricultural information from a much broader digital ecosystem, including Facebook, TikTok, WhatsApp groups, and local government online training. Future research may benefit from analyzing multiple content sources to understand how different digital platforms shape perceptions of agricultural technology in unique ways.

Fourth, the research did not explore the structural and economic barriers that influence farmers' ability to adopt technology. While respondents expressed interest and hope, this study did not measure access to infrastructure, affordability of tools, or the availability of local institutional support. Future studies should examine the readiness of rural communities using frameworks such as the Technology Readiness Index (TRI), digital literacy assessments, and economic feasibility studies to provide more comprehensive recommendations for policymakers.

Fifth, cultural factors that influence perceptions of technology were only partially addressed. Saparua farmers operate within strong social and traditional structures, including semarga (extended families) kinship groups, mata rumah institutions, and church-based communities. These structures play an important role in decision-making regarding the adoption of innovations. Future research could incorporate cultural communication frameworks or ethnographic methods to explore how identity, tradition, and collective norms shape responses to agricultural modernization.

Finally, technological determinism and diffusion of innovation were applied as primary theoretical lenses; however, additional frameworks—such as media ecology, social construction of technology (SCOT), or the technology acceptance model (TAM)—could offer richer theoretical insights. Future studies may consider mixed-theory analyses to produce a more holistic understanding of how rural communities negotiate digital transformation. Overall, future research

should explore multi-platform media exposure, expand the geographic scope, include quantitative measures, and integrate cultural analyses to strengthen further understanding of how rural farmers adopt and interpret agricultural technologies.

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