Empowering Thai Dairy Farmers: Overcoming Challenges and Enhancing Competency through Integrated Communication Strategies

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Abstract

The dairy industry in Thailand is crucial for ensuring food security and driving economic development. However, Thai dairy farmers encounter significant challenges that impede their competency and productivity. This academic research aims to explore these challenges and suggest communication strategies to enhance the proficiency of dairy farmers in Thailand.

Despite the sector's steady growth, structural constraints such as small-scale operations and limited access to resources significantly hinder efficiency. Additionally, the quality of feed, animal health issues, and fluctuating market dynamics exacerbate the difficulties faced by farmers. To address these challenges, the paper advocates for integrated communication strategies informed by theoretical frameworks such as the Technology Acceptance Model (TAM), Diffusion of Innovation theory, and the Knowledge-Attitude-Practice (KAP) theory. Proposed solutions include tailored workshops, enhanced extension services, and the integration of mobile technology to empower farmers and foster sustainable agricultural development.

Collaborative efforts with stakeholders and adopting a sustainable livelihood approach are essential for building resilience in the sector. Future research should investigate the integration of digital technologies and the role of social networks in further enhancing farmers' competency. Acknowledging the limitations of the current study, robust interventions can be designed to support the Thai dairy industry effectively.

Keywords: 1) Dairy farmer 2) Communication strategies and technology

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Introduction

The Essential Role of Communication Strategies in Agriculture and Livestock Management for Effective communication strategies are crucial in the agricultural sector, particularly in livestock management, where they play a vital role in enhancing farmers' competencies, promoting sustainable practices, and ensuring food security. In the context of Thai dairy farming, these strategies are instrumental in bridging the knowledge gap between research and practical application, facilitating the adoption of innovative technologies, and improving overall productivity and sustainability. Agriculture, especially livestock farming, is heavily dependent on the dissemination of information and the adoption of best practices. Farmers need to be well-informed about the latest developments in animal husbandry, disease management, and market trends to make informed decisions that affect their livelihood and the quality of their produce (Makarapong, et al., 2020, p. 2). Effective communication strategies ensure that vital information reaches farmers timely and is understood and applied correctly. Several communication strategies are utilized in the agricultural sector to improve farmers' knowledge and practices. These include extension services, farmer field schools, information and communication technologies (ICT), and participatory approaches. Extension services and farmer field schools have traditionally been the backbone of agricultural communication, providing face-to-face interactions and hands-on (Alex, Zijp and Byerlee, 2002). However, the advent of ICT has revolutionized agricultural communication by offering new avenues such as mobile apps, social media, and online platforms that provide real-time information and support to farmers (Aker, 2011, p. 640). Despite the availability of various communication tools, several challenges hinder effective communication in the agricultural sector. These challenges include literacy levels, language barriers, cultural differences, and the digital divide (Leeuwis and Aarts, 2011, p. 31). In Thailand, for instance, many dairy farmers operate in remote areas with limited access to modern communication technologies, making it difficult to reach them with critical information. Moreover, the content and delivery of information often need to be tailored to meet the specific needs and circumstances of different farming communities.

The dairy industry plays a significant role in Thailand's agricultural sector, contributing to food security, rural livelihoods, and economic development. Despite the sector's potential, Thai dairy farmers face numerous challenges that hinder their competency and productivity. This paper explores the current situation of Thai dairy farmers, highlighting key challenges and proposing strategies to enhance their competency. The dairy sector in Thailand has experienced steady growth in recent years, driven by increasing demand for dairy products fueled by population growth, urbanization, and rising incomes (Makarapong, et al., 2020, p. 11). However, the domestic dairy production falls short of meeting the country's demand, resulting in a reliance on imports to bridge the gap. This dependency on imports poses challenges for domestic dairy farmers, who struggle to compete with im-

ported products in terms of price and quality. Moreover, Thai dairy farmers face various structural and systemic challenges that limit their productivity and profitability. One of the primary challenges is the small-scale nature of dairy farming operations in Thailand, characterized by fragmented landholdings and limited access to resources and technology. Small-scale farmers often lack the capital and infrastructure needed to invest in modern dairy farming practices, leading to low productivity and efficiency. Additionally, Thai dairy farmers confront challenges related to feed availability and quality, as well as issues concerning animal health and disease management (Kaewbang, et al., 2024, p. 1251). Inadequate access to high-quality feed and veterinary services hampers the growth and development of dairy cattle, impacting milk production and overall farm profitability. Furthermore, climatic factors such as heat stress pose significant challenges for dairy farmers in Thailand, affecting animal welfare and productivity.

The current situation of Thai dairy farmers is further compounded by market dynamics and policy constraints. Fluctuations in milk prices and market volatility add uncertainty to dairy farming profitability, discouraging investments in the sector (Makarapong, et al., 2020, p. 11). Moreover, policy frameworks and regulatory barriers often favor large-scale dairy enterprises over smallholder farmers, exacerbating inequalities and limiting opportunities for small-scale producers to thrive (Makarapong, et al., 2020, p. 2). Thai dairy farming has made significant progress over the years, contributing substantially to the country's agricultural economy. However, the sector faces several challenges that affect its productivity and sustainability. These challenges include limited access to high-quality feed, inadequate veterinary services, and a lack of modern farming equipment and technologies (Chantalakhana and Skunmun, 2002, p. 24). One of the major issues is the limited access to information and training for dairy farmers. Many farmers rely on traditional knowledge and practices, which may not be sufficient to meet the demands of modern dairy farming. Extension services, though available, are often under-resourced and unable to reach all farmers effectively. This gap in knowledge and skills hampers the ability of farmers to adopt innovative practices and improve their productivity. In light of these challenges, there is a pressing need to enhance the competency of Thai dairy farmers to improve their resilience, productivity, and livelihoods. Addressing the structural constraints faced by small-scale farmers, promoting access to resources and technology, and strengthening support mechanisms for dairy farming are essential steps towards achieving this goal. By empowering Thai dairy farmers with the knowledge, skills, and resources needed to adopt modern and sustainable farming practices, the dairy sector can play a more significant role in driving inclusive rural development and food security in Thailand. Market access is another critical issue for Thai dairy farmers. Many farmers are unable to access larger markets and sell their produce at competitive prices, limiting their income and ability to invest in farm improvements (Rajchamaha and Makararpong, 2023, p. 2) and get the official support

from government. Improving communication between farmers, market and government agency players can help bridge this gap, providing farmers with better market information and opportunities to enhance their economic viability. This research aims to identify the challenges faced by Thai dairy farmers that affect their productivity and competency and to propose communication strategies to enhance their proficiency. The study focuses on using theoretical frameworks and integrated approaches, including workshops, extension services, and mobile technology, to empower farmers and promote sustainable development.

Literature Review

1. Technology Acceptance Model (TAM)

The Technology Acceptance Model (TAM), proposed by Davis in 1989, has been widely utilized to understand users' acceptance and adoption of technology. TAM posits that perceived usefulness and perceived ease of use significantly influence users' attitudes and intentions towards using a technology. Perceived usefulness refers to the degree to which an individual believes that using a particular system would enhance their performance, while perceived ease of use relates to the extent to which a person believes that using the system would be free of effort. These perceptions, in turn, influence actual usage behavior.

Numerous studies have confirmed the effectiveness of TAM in various contexts, including healthcare, education, and business. For instance, Wu and Wang (2005, p. 720) applied TAM to investigate the acceptance of mobile healthcare services, finding that perceived usefulness and ease of use significantly impacted users' intention to adopt such services. Similarly, Venkatesh and Davis (2000, p. 190) extended TAM to include social influence factors and demonstrated its applicability in predicting users' intentions to use information technology in organizations. And studies by (Rajchamaha and Makararpong, 2023, p. 86) examined farmers' acceptance of mobile-based livestock management applications, emphasizing the role of perceived usefulness and ease of use in shaping adoption decisions.

2. Diffusion of Innovation

Rogers' Diffusion of Innovation theory, introduced in 1962, focuses on how new ideas, products, and technologies spread through social systems over time. The theory identifies five adopter categories: innovators, early adopters, early majority, late majority, and laggards. The diffusion process is influenced by various factors, including the perceived attributes of the innovation, communication channels, social networks, and the context within which the innovation is introduced.

Numerous studies have applied the Diffusion of Innovation theory to understand the adoption and diffusion of technologies in different contexts. For example, Rogers (2003, p. 5) demonstrated the theory's utility in explaining the spread of innovations in healthcare settings, emphasizing the role of opinion leaders and communication channels in the diffusion process. For instance, studies by Reardon, Berdegué and Escobar (2001, p. 403) and Fuglie and Heisey (2007, pp. 1-8) explored

the diffusion of improved livestock breeds and biotechnologies, highlighting the importance of addressing farmers' perceived benefits and concerns.

3. Crossing the Chasm

Geoffrey Moore's Crossing the Chasm model addresses the challenges of transitioning from early adopters to mainstream market acceptance. According to Moore (2002, pp. 21-22), there exists a significant gap, or "chasm," between the early adopters who are willing to embrace new technologies and the pragmatic majority who are more skeptical and risk-averse. Crossing this chasm requires targeted marketing efforts, focused on addressing the specific needs and concerns of mainstream users.

Research applying Crossing the Chasm theory has primarily focused on strategies for bridging the gap between early adopters and mainstream users. For instance, Peffers, et al. (2006, p. 51) explored the application of Crossing the Chasm principles in the context of e-government initiatives, emphasizing the importance of understanding the unique needs and concerns of different user segments. Similarly, Spielman, et al. (2011, p. 618) examined strategies for promoting the adoption of sustainable livestock management practices, highlighting the need for effective communication channels and partnerships.

4. Knowledge, Attitude, and Practice (KAP) Theory

The Knowledge, Attitude, and Practice (KAP) theory is commonly used in public health and social sciences to assess the factors influencing behavior change. The theory posits that individuals' knowledge about a particular issue, their attitudes towards it, and their actual practices are interrelated and influence each other. Understanding these factors is essential for designing effective interventions to promote behavior change and adoption of new practices or technologies.

Numerous studies have applied the KAP theory to investigate technology adoption and behavior change in various contexts. For example, Liao, Nguyen and Sasaki (2022, p. 45) utilized the theory to assess farmers' knowledge, attitudes, and practices regarding sustainable agricultural practices, highlighting the importance of targeted educational interventions in promoting adoption. Moreover, studies by Mulugeta, et al. (2024, p. 2) utilized KAP surveys to assess farmers' knowledge, attitudes, and practices related to livestock health and nutrition, informing the design of context-specific communication interventions.

In conclusion, farmers' competency in livestock management plays a crucial role in sustainable agricultural development Rajchamaha and Makararpong (2023, p. 94). Effective communication strategies are essential for disseminating knowledge and promoting the adoption of best practices among farmers. Drawing from various theoretical frameworks, including the Technology Acceptance Model (TAM), Diffusion of Innovation, Crossing the Chasm, and the Knowledge, Attitude, and Practice (KAP) theory, researchers have explored strategies to enhance farmers' competency in livestock management through targeted communication interventions.

Research Method

This study employed a qualitative research design, utilizing document analysis and literature review methods to gather and analyze data. The aim was to explore the challenges faced by Thai dairy farmers and suggest communication strategies to enhance their proficiency. Data was collected from a variety of sources, including textbooks, academic journals, research publications, and reports from both national and international contexts. These sources were chosen to provide a comprehensive understanding of the dairy farming sector in Thailand and the communication strategies employed in agricultural settings. The study was guided by several theoretical frameworks to inform the analysis and development of communication strategies: Technology Acceptance Model (TAM), Diffusion of Innovation Theory, Crossing the Chasm Framework and Knowledge, Attitude, and Practice (KAP) Theory These frameworks provided a structured approach to understanding the factors influencing technology adoption and communication effectiveness among farmers.

Literature Review: A thorough review of existing literature on dairy farming in Thailand and relevant communication strategies was conducted. This included academic articles, government reports, and publications from agricultural organizations. Data Synthesis: The collected data was synthesized to identify common challenges faced by Thai dairy farmers, such as limited access to resources, small-scale operations, and market fluctuations. Strategy Development: Based on the insights from the theoretical frameworks, integrated communication strategies were developed. These strategies aimed to address the identified challenges and enhance farmers' competency through tailored interventions.

Content

This academic journal conducts analysis and document research by the process of qualitative research, literature review, theory and relevant literature. Data was collected from textbooks, journals, research publication from both national and international sources.

Integrated Communication Strategies: Drawing upon insights from TAM, Diffusion of Innovation theory, Cross the Chasm framework, and KAP theory, integrated communication strategies can be developed to enhance Thai farmers' competency in livestock management, it's important to consider the unique cultural, economic, and educational context of the country. These strategies may include:

Localized Workshops and Training: Organize workshops and training sessions tailored to specific regions within Thailand. These sessions should focus on practical skills relevant to local livestock farming practices. Incorporate hands-on activities, demonstrations, and interactive sessions to engage farmers actively.

Extension Services: Strengthen extension services by deploying agricultural experts and advisors to rural areas. These experts can provide personalized guidance and support to farmers, addressing their specific challenges and needs related to livestock management.

Use of Local Language and Media: Communicate information in the local Thai

language to ensure better understanding among farmers. Utilize various media channels such as radio, television, and community newspapers to disseminate educational content on livestock farming techniques, disease prevention, and market trends.

Demonstration Farms: Establish demonstration farms in different regions to showcase best practices in livestock management. Farmers can visit these farms to observe firsthand how to implement modern techniques for improved productivity and animal welfare.

Peer Learning Networks: Facilitate peer learning networks where experienced farmers mentor and share their knowledge with others in their community. This informal exchange of information can be highly effective in promoting innovation and skill development among farmers.

Mobile Technology: Leverage mobile technology to deliver agricultural information directly to farmers' smartphones. Develop mobile applications or SMS-based services that provide timely updates, weather forecasts, market prices, and tips on livestock care.

Partnerships with Agricultural Organizations: Collaborate with government agencies, non-profit organizations, and research institutions working in the field of agriculture to leverage their resources and expertise. Pooling resources can lead to more comprehensive and impactful communication campaigns.

Incentives and Recognition: Offer incentives such as subsidies, grants, or certification programs to encourage farmers to adopt modern and sustainable livestock farming practices. Recognize and reward farmers who demonstrate exceptional competency and innovation in their operations.

Continuous Feedback Mechanism: Establish a feedback mechanism where farmers can provide input on the effectiveness of communication strategies and suggest areas for improvement. This two-way communication ensures that interventions are responsive to the evolving needs of the farming community.

Sustainable Livelihood Approach: Frame communication efforts within the context of sustainable livelihoods, emphasizing the long-term viability of livestock farming as a source of income and food security. Highlight the importance of environmental conservation, animal welfare, and social equity in farming practices.

By implementing these communication strategies tailored to the needs and preferences of Thai farmers, stakeholders can effectively enhance their competency in livestock management, ultimately contributing to the sustainable development of the agricultural sector in Thailand. Incorporating AI can further refine these strategies by providing data-driven insights, automating routine tasks, and facilitating advanced monitoring and forecasting to improve overall efficiency and resilience in the sector.

Conclusion and Discussion

In conclusion, the integration of communication strategies informed by a comprehensive framework encompassing the Technology Acceptance Model (TAM), Diffusion of Innovation theory, Crossing the Chasm frame-

work, and Knowledge, Attitude, and Practice (KAP) theory provides a robust approach to uplift the competency of Thai farmers in livestock management. Acknowledging the multifaceted nature of Thailand's cultural, economic, and educational milieu is paramount in crafting effective interventions.

Firstly, localized workshops and tailored training sessions emerge as pivotal tools in equipping farmers with practical skills germane to their specific regions. These sessions should be meticulously designed to encompass hands-on activities, demonstrations, and interactive engagements, ensuring maximal participation and knowledge absorption among farmers. Moreover, the reinforcement of extension services by deploying adept agricultural experts to rural hinterlands is imperative. These specialists can furnish personalized guidance, addressing the nuanced challenges and requisites pertinent to livestock management. Such personalized interactions serve as conduits for fostering comprehension and skill enhancement among farmers. Communication tailored in the local Thai language is pivotal for fostering comprehension and ensuring effective dissemination of vital information among farmers. Employing diverse media channels including radio, television, and community newspapers aids in promulgating educational content on diverse facets of livestock farming, encompassing techniques, disease prevention, and market trends.

Furthermore, the establishment of demonstration farms across diverse regions emerges as an indispensable tool in showcasing best practices in livestock management. Farmers' direct exposure to these farms enables firsthand observation and emulation of modern techniques, catalyzing enhanced productivity and animal welfare practices. Facilitating peer learning networks is instrumental in nurturing innovation and skill development among farmers. These informal exchanges, facilitated by experienced farmers, serve as fertile grounds for knowledge transfer and collective learning, bolstering agricultural efficacy within communities. Leveraging mobile technology holds promise in democratizing access to agricultural information. Developing mobile applications or SMS-based services enables the delivery of timely updates, weather forecasts, market prices, and livestock care tips directly to farmers' smartphones, empowering them with actionable insights. For example, AI-powered apps can analyze weather patterns and provide farmers with personalized recommendations on optimal times for feeding or breeding, enhancing decision-making and efficiency. Moreover, to illustrate the practical application of the proposed strategies, specific examples of AI implementation were incorporated. For instance: AI-Powered Mobile Apps: Mobile applications that utilize AI to analyze weather patterns and provide personalized farming recommendations. Predictive Analytics: AI tools to forecast market trends and optimize resource allocation. Health Monitoring: AI-enabled sensors for real-time analysis of livestock health data, alerting farmers to potential issues early.

Collaborative ventures with governmental bodies, non-profit organizations, and research institutions augur well for compre-

hensive communication campaigns. Pooling resources and expertise facilitates the design and execution of impactful interventions, tailored to address the diverse needs of Thai farmers. Offering incentives such as subsidies, grants, or certification programs incentivizes the adoption of modern and sustainable livestock farming practices. Additionally, recognizing and rewarding farmers demonstrating exceptional competency and innovation serves as a potent motivator for widespread adoption.

Establishing a continuous feedback mechanism ensures the responsiveness of communication strategies to the evolving needs of the farming community. Farmers' inputs serve as invaluable insights for refining interventions and ensuring their efficacy in fostering sustainable agricultural practices. AI can play a crucial role here by analyzing feedback data to identify trends and areas needing improvement, ensuring strategies remain relevant and effective. Framing communication efforts within the context of sustainable livelihoods underscores the imperative of environmental conservation, animal welfare, and social equity in farming practices. Highlighting the long-term viability of livestock farming as a source of income and food security resonates with farmers' aspirations and fosters their buy-in into sustainable practices. AI can further enhance these efforts by offering predictive analytics for market trends, optimizing resource allocation, and automating routine tasks such as health monitoring through AI-enabled sensors, thus improving overall efficiency and resilience in the sector. For instance, AI-driven platforms could provide real-time analysis of livestock health data, alerting farmers to potential issues before they become critical, thereby improving animal welfare and farm productivity. In essence, by judiciously implementing these communication strategies attuned to the idiosyncratic needs and preferences of Thai farmers, stakeholders can catalyze a paradigm shift in livestock management practices, ushering in a new era of sustainability and resilience in Thailand's agricultural sector. The study emphasized the importance of collaborative efforts with government agencies, non-profit organizations, and research institutions. A continuous feedback mechanism was proposed to ensure that communication strategies remain responsive to the evolving needs of the farming community. By employing a qualitative research approach and leveraging theoretical frameworks, this study developed comprehensive communication strategies tailored to the unique needs of Thai dairy farmers. The integration of Internet of things and AI technologies was highlighted as a key factor in enhancing the effectiveness and sustainability of these strategies.

Future Work

Future research could explore the impact of integrating advanced digital technologies, such as artificial intelligence and Internet of Things (IoT), into communication strategies for Thai farmers. Assessing the effectiveness of these technologies in delivering personalized and real-time agricultural information could further enhance farmers' competency and productivity. Additionally, investigating the role of social networks and online communities in

knowledge sharing among farmers could provide insights into alternative communication channels. Furthermore, longitudinal studies tracking the long-term outcomes of communication interventions on farmers' adoption of sustainable practices and economic livelihoods would offer valuable insights for policy and programmatic interventions. However, it's important to acknowledge the limitations of this study, including potential biases in data collection and the generalizability of findings beyond the Thai context. Addressing these limitations through robust methodology and diverse stakeholder engagement would strengthen the validity and applicability of future research endeavors.

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