

FACTORS INFLUENCING RICE FARMERS TO PARTICIPATE IN AGRICULTURAL DEVELOPMENT PROGRAMME

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Article history

Received date : 20-6-2025
Revised date : 21-6-2025
Accepted date : 21-7-2025
Published date : 4-9-2025

To cite this document:

Madlaim, N. I. N., & Kamarul Zaman, N. B. (2025). Factors influencing rice farmers to participate in agricultural development programme. *International Journal of Accounting, Finance and Business (IJAFB)*, 10 (62), 1 - 12.

Abstract: *Rice is a strategic commodity for Malaysia as it is the staple food for Malaysians. However, the rice sector constantly faces various challenges that lead to unsustainable supply, directly threatening food security in the country. Therefore, the rice sector always receives government intervention such as organizing expansion programs aimed at increasing rice yields in the country. Although the policy of rice sufficiency through local production has long been the main focus of the government, however, to make these policies successful, the participation from the target group, namely the rice farmers, is the main determinant of the success of a program. The question is, what are the probability factors that influence rice farmers to accept or participate in the development programs to increase rice yields that have been organized by the extension agencies. Therefore this study seeks to understand the factors that influence farmers to participate in agricultural development programs organized by extension agencies. A systematic literature review of the peer-reviewed literature was undertaken to analyze the related factors that influenced farmers to participate in agriculture development programs.*

Keywords: *Rice, Food Security, Rice Programs*

Introduction

Rice (*Oryza sativa*) is a prevalent staple in Malaysia and holds great cultural importance. Rice is prominent component of the Malaysian diet, since the average Malaysian consumes 87.9 kilogrammes of rice per year (KRI, 2019, Kalimuthi, K., & Applanaidu, S. D., 2024). Over half of the world's population consumes rice as their staple food, and cultivation in Asia produces 90% of the world's rice (Muhammad Hishammuddin Johari et al., 2024). The global population exceeded 7.6 billion people in 2018 (FAO, 2020) and is predicted to reach 9.2 billion by 2050 (Silva, 2018), with a projected increased food demand of 59%-102% (Elferink & Schierhorn, 2016, Fukase & Marin, 2017). In view of the above it seems necessary to increase agricultural production by about 60%-70% to provide food for the global population in 2050 (Silva, 2018). According to Foley et al. and Tilman et al., food production needs to as much as double by 2050 to meet the increasing demand.

Paddy is a major crop which recently has become one of the focuses of the transformation policy of the government. Despite the many government incentives and benefits given to this sector, the paddy farmers are still amongst the poorest in the country (Nurul Aien Binti Abd Aziz et al., 2015). This situation underscores the challenges faced by rice farmers despite the attention given to their sector. Previous studies, such as those examining factors influencing farmers' participation in agricultural development programs, have highlighted various issues that contribute to the socioeconomic struggles of rice farmers. These include limited access to agricultural technology, inadequate support systems, and the impact of environmental factors on rice yields. Additionally, research on the adoption of agricultural innovations, such as improved rice varieties or sustainable farming practices, has revealed barriers to implementation that further hinder farmers' ability to improve their livelihoods. Therefore, while government policies and initiatives may aim to address these challenges, a deeper understanding of the underlying factors influencing rice farmers' socioeconomic status is necessary to develop targeted interventions that effectively uplift their well-being and enhance the sustainability of the rice farming sector.

The agricultural sector plays a strategic role in improving the availability of food and achieving food security (Smutka et al., 2019, Otsuka, 2013, Smutka et al., 2015, Wegren & Elvestad, 2018). Bearing in mind the agriculture has a much greater impact on reducing poverty and improving food security than the other sectors of the economy (Irz et al., 2011, Majid, 2004). The agricultural sector is vital for economic and social development, yet rice farmers face significant challenges, including resource scarcity, climate change, and reliance on traditional practices. These issues hinder productivity and adaptation efforts, necessitating approach to enhance resilience and sustainability in rice farming (Doeur, 2021, Akanbi et al., 2022, Wehmeyer et al., 2022, Jamal et al., 2023, Muadz & Muhyidin, 2024). Conversely, while challenges are significant, there is potential for innovation and improvement through targeted policies and community-driven initiatives that can empower rice farmers to overcome these obstacles and enhance their resilience against climate change. To overcome these challenges and increase agricultural productivity, the government often implements agricultural development programs (N.B.K. Zaman et al., 2019). However, the success of these programs depends on the active participation of farmers. Therefore, it is important to understand the factors that influence rice farmers to participate in agricultural development programs. This study aims to explore those factors through a critical analysis of existing literature.

Agricultural development programmes play a vital role in improving food security, enhancing productivity, and reducing rural poverty (Pawlak & Kołodziejczak, 2020). In Malaysia, various

government initiated programmes have been introduced to modernise paddy cultivation, such as the SMART SBB (Smart Sawah Berskala Besar), the Paddy Estate Scheme, and mechanisation initiatives. However, the level of farmer participation remains varied, with some farmers choosing not to participate despite potential benefits. Agricultural development programs encompass a variety of components aimed at enhancing productivity, sustainability, and the welfare of farmers. These programs are crucial for addressing food security and environmental challenges while promoting economic growth. Key aspects include the provision of agricultural inputs (Wijaya et al., 2022), technological advancements (Sultan, n.d.), infrastructure development (Sultan, n.d., Salazar et al., 2024), promotion of sustainable practices, farmer training (Abobatta & Fouad, 2024, Salazar et al., 2024), and the financial support (Wijaya et al., 2022, Sultan, n.d.). In addition, agricultural development programs play a crucial role in enhancing the viability of the agricultural sector and improving the living standards of farmers and rural communities. These programs focus on various aspects, including natural resource management, soil conservation, crop and livestock breeding, and community empowerment (Indraningsih & Swastika, 2022, Syahputri et al., 2023, Rai, 2023, Falah et al., 2024)

This study reviews the participation of rice farmers in agricultural development programme with a focus on understanding the underlying factors influencing their decision to engage in such initiatives. This study helps in understanding why some farmers participate in agricultural development programs while others do not. These factors are important to plan programs that are more effective and relevant to the needs of rice farmers. In addition, this study can also identify obstacle that farmers may face in participating in the program, and find ways to overcome them. Furthermore, this study also shows the impact of agricultural development programs on rice farmers and the agricultural community as a whole. This analysis helps to assess the impact and effectiveness of the programs and make the necessary adjustments to improve their impact. Understanding the factors that influence farmers' acceptance of these programs is important to plan effective support programs and ensure the sustainability and productivity of the agricultural sector in the area.

Methods

Study selection

The scope of this review is based on the influence of factors and benefits of rice farmers who participate in the agricultural development program, which can increase rice yields in the country. From this review, the roles of upper capital may also assist to build up the farmers' organisations and groups by receiving input through the benefits programme.

The articles published were retrieved from Google Scholar, Science Direct, and Scopus using combinations of synonyms and keywords. These databases were chosen given that they contain a huge number of abstracts and peer-reviewed publications from worldwide publishers in various scientific fields. The articles included in this review were published from 2013 to 2022.

Screening

All studies discovered during the search were examined based on a set of specific criteria for inclusion. This review concentrates on identifying two distinct factors and their associated benefits, which vary in terms of the data they provide. A multi-stage screening process was implemented, starting from titles and abstracts, then proceeding to a partial review of the text, and finally culminating in a thorough examination of the full text. Throughout this screening

process, increasingly stringent were applied at each stage. During the full-text review, studies were independently assessed by two reviewers, with any discrepancies resolved by the primary reviewer. A final evaluation of the studies' relevance was conducted, taking into account methodological criteria, before reaching a conclusive judgement.

Data extraction and analysis

All studies included in the analysis were examined. Information regarding bibliographic details, project characteristics, implementation strategies, and methodological approaches was gathered from the research. The models and methodologies employed to assess rice farmers were influential factors in the participation in the agricultural development programme. The analysis section of each article, along with its statistical tables, was examined for potential insights into the significance of factors influencing rice farmers' involvement in agricultural development programme in Malaysia, providing groundwork for future research. Articles meeting the review's criteria were identified through a comprehensive search to elucidate factor information. Factors and associated benefits were categorized into various groups to enhance the depth of study in the review. Additionally, the study underwent extensive revision by multiple researchers.

Result & Discussion

Table 1: Factors on rice farmers participate in Agricultural Development Programme.

No.	Author	Year	Source Title	Country	Purpose Of Study	Factor
1	Thomas Bilalib Udimal et al (2017)	2017	Factors influencing the agricultural technology adoption: The case of improved rice varieties (Nerica) in the Northern Region, Ghana	Ghana	To analyze the factors influencing the adoption of Nerica rice technology in the Northern Region of Ghana	Farm size, credit access, on-farm demonstration, tractor ownership, family labor, age, and profit orientation
2	Alphonse Nahayo et al (2017)	2017	Factors influencing farmers' participation in crop intensification program in Rwanda	Rwanda	To assessing the factors that influence their participation.	Gender, age group, household size, education level, farm income, non-farm income, farmland size, farming experience, livestock ownership, and intitutional variables
3	Melanie Connor et al (2021)	2021	Sustainable rice production in the Mekong River Delta: Factors influencing farmers' adoption of the integrated technology package "One Must Do, Five Reductions" (IM5R)	Vietnam	To investigate the factors affecting the adoption of sustainable rice farming practices combined in the national program "One Must Do, Five Reductions" (IM5R).	Age, household size, number of full years farming, gender, civil status, education, mamber of cooperative, area cultivated, and yield.
4	Alexander	2013	Factors influencing	Ghana	To identify factors, which delimitate	District, gender, age, marital status, education,

	Nimo Wiredu et al (2013)		farmer's participation in agricultural projects: The case of the agricultural value chain mentorship project in the Northern Region of Ghana		farmer's participation in agricultural projects using the case of the Agricultural Value Chain Mentorship Project.	household size, received credit, received extension, and farm size.
5	Edward Martey et al (2014)	2014	Factors influencing willingness to participate in multi-stakeholder platform by smallholder farmers in Northern Ghana: implication for research and development	Ghana	To identified the factors that influence willingness to participate in innovation platform and also tested the level of agreement among the identified constraints associated with participation using the Probit model and Kendall's coefficient of concordance respectively.	Gender, age, marital status, education, household size, land availability, total income, membership of association, distance, and major farming decision.
6	Nyein Nyein Kyaw et al (2018)	2018	Analysis of the factors influencing market participation among smallholder rice farmers in Magway Region, Central Dry Zone of Myanmar	Myanmar	To examine the factors affecting the market participation of smallholder farmers and find ways to improve the income and livelihood of smallholder farmers, focusing on Myothit Township in Magway Region, Central Dry Zone of Myanmar.	Household head age, education status, household size, total produce of rice, price of rice, household income, ownership of livestock, membership of farmer organization, access to roads, distance to market, access to extension services, and market information.
7	Abdullahi Alhaji Jamilu et al (2015)	2015	Factors influencing smallholder farmers participation in IFAD-Community based agricultural and rural development project in Katsina State	Katsina State	To assessed factors influencing smallholder farmers' participation in IFAD-Community based agricultural and rural development project in Katsina.	Age, level of education, family size, farm size, gender, membership of co-operative, extension contact and amount of credit used.
8	Yupadee Methamontri et al (2022)	2022	Factors influencing participation in collective marketing through organic rice farmer groups in northeast Thailand	Thailand	To examine factors associated with participation in collective marketing for three organic rice farmer groups in Yasothon Province of Thailand, producing organic jasmine rice for export and domestic markets	Education, paddy cultivation area size, non-agricultural income, experience in rice farming, experience in organic rice farming, group membership duration, perceived economic benefits, and membership with Na So farmer group were

					through contract farming.	positively associated with the extent of participation.
9	Nur Badriyah Kamarul Zaman et al (2019)	2019	Factors affecting adoption of Paddy Estate Project among rice farmers for increasing rice production and supply.	Malaysia	To identify the factors on the adoption of PEP among farmers.	Age, secondary jobs, effective communication with the extension agency, increased rice yield, lower operating cost, lower working time in the fields, and support services, such as assistance, incentives, and facilities from the government.
10	Nurul Aien Binti Abd Aziz et al (2015)	2015	Factors influencing the paddy farmers' intention to participate in Agriculture Takaful	Malaysia	To investigate factors influencing the intention to participate in Agriculture Takaful	Subjective norms, perceived risk, perceived behaviour control, and attitude.
11	Yunxiao Bai et al (2024)	2024	Factors influencing the progressive adoption of integrated rice-fish systems by farmers and its relapse	China	To subdivide the adoption stages of farmers and explore the influencing factors that affect each stage	Attitude, PBC, subjective norms, Government & policy evaluations, ecological concerns.
12	Le Canh Bich Tho et al (2021)	2021	1M5R technical practice and the economic performance of rice smallholders in the Vietnamese Mekong delta	Vietnam	To employ the propensity score matching (PSM) approach to investigate the factors that affect the adoption of the 1M5R practice	Age, gender, education level, farming experience, household size, rice land, no. of rice plots, credit, training, off-farm, cooperative membership, farmer's association.
13	Julia Checco et al (2023)	2023	Adoption of Improved Rice Varieties in the Global South: A Review	Global South	To show a consensus on the important determinants influencing the adoption of IRVs in the Global South	Farm biophysical, Household & farmer, Institutional & access, Technology-specific
14	Nguyen Nguyen et al (2024)	2024	Adoption of sustainable farming practices in Vietnam: A discourse of the determining factors	Vietnam	To delve into the intricacies of sustainable agricultural practices, our study investigates both the behavioral and non-behavioral factors influencing farmers' decision-making processes	Human capital, natural capital, financial capital, physical capital, social capital

Sources: extracted from articles review

Agricultural Technology

Agricultural technology has long been recognized as a critical driver of farmers' participation in agricultural development programs. Innovations such as improved rice varieties and the "1M5R" initiative have demonstrated tangible benefits, including higher productivity and reduced costs (Connor et al., 2021). Such improvements create strong incentives for farmers to engage in programs designed to increase efficiency and profitability.

However, enthusiasm for technological innovation often overlooks critical socio-demographic barriers. Studies by Phi et al. (2021) and Li et al. (2024) indicate that older farmers are less willing or able to adopt new technologies due to limited exposure, resistance to change, and difficulty adapting to digital tools. Many prefer traditional methods that are more familiar and less risky. This underscores that technology alone cannot guarantee universal adoption.

Recent studies expand this perspective. Le Canh Bich Tho et al. (2021) reveal that adoption of 1M5R in Vietnam depends not only on its technical promise but also on household size, education, gender, farming experience, access to credit, and cooperative membership. Similarly, Checco et al. (2023) argue that in the Global South, technology adoption is shaped by farm biophysical conditions, household capacities, institutional access, and technology-specific features. Yunxiao Bai et al. (2024), examining integrated rice-fish systems in China, further highlight that adoption occurs progressively across different stages, influenced by farmers' attitudes, subjective norms, perceived behavioral control, and government policy.

Taken together, these findings demonstrate that while technology is a powerful motivator, successful adoption requires alignment with socio-demographic realities, institutional support, and policy frameworks. Adoption should be seen as a multidimensional and dynamic process rather than a purely technical decision.

Support and Incentives

Support and incentives consistently emerge as crucial determinants of farmers' participation. Nyein Nyein Kyaw et al. (2018) found that training, financial assistance, and resource provision in Myanmar increased farmers' market participation. Similarly, Jamilu et al. (2015) highlight that participation in IFAD projects in Nigeria was strongly linked to targeted financial support and capacity-building initiatives.

However, not all incentives are equally effective. Ghimire et al. (2015) argue that poorly designed support programs risk creating unequal access to resources, thereby excluding marginalized farmers. Tang et al. (2020) also argue that financial support alone is unsustainable without complementary training and resources. This aligns with Udimal et al. (2017) and Nahayo et al. (2017), who emphasize the need for integrated approaches that combine technological and institutional support to sustain farmer participation.

Newer studies both reinforce and extend these earlier insights. For instance, Le Canh Bich Tho et al. (2021) highlight that access to credit, farmer training, and cooperative networks significantly enhances the adoption of 1M5R practices. Similarly, Yunxiao Bai et al. (2024) underscore the importance of government policy and ecological considerations, emphasizing that consistent and coherent policy frameworks are critical in sustaining adoption. Adding further depth, Nguyen Nguyen et al. (2024) conceptualize farmer support through five forms of capital, financial, physical, natural, and social. Arguing that a holistic and integrated support system better positions farmers to embrace sustainable practices.

Collectively, these findings suggest that the effectiveness of incentives rests not only on their mere availability but also on their design, inclusiveness, and long-term sustainability.

Demographic and Economic Needs

Demographic and economic conditions strongly influence participation in agricultural programs. Younger farmers and those with higher educational attainment are generally more receptive to adopting modern practices (Nur Badriyah Kamarul Zaman et al., 2019). Education enhances adaptability, while younger age groups are less risk-averse and more open to innovation.

At the same time, economic realities often constrain participation. Islam et al. (2017) show that financial hardship and risk aversion can overshadow demographic advantages, making farmers hesitant to invest in new methods. Yameogo et al. (2018) further argue that financial incentives alone cannot overcome cultural resistance to change, particularly among older or more traditional farmers.

Recent studies confirm and expand these observations. Le Canh Bich Tho et al. (2021) identify key demographic factors like age, gender, education, farming experience, and household size—as determinants of 1M5R adoption. Checco et al. (2023) stress that household-level economic conditions and access to resources in the Global South heavily influence willingness to adopt improved rice varieties. Nguyen Nguyen et al. (2024) extend this further by showing that farmers' readiness depends on multiple capitals, financial, natural, physical, and social that collectively shape their decision-making processes.

Therefore, adoption decisions are best understood not only through individual demographic profiles but also through the economic and structural contexts within which farmers operate.

3.4 Social and Community Environment

The social and community environment significantly shapes farmers' willingness to participate in agricultural development programs. Supportive social networks, farmer groups, and community awareness foster collaboration and knowledge-sharing. Methamontri et al. (2022) found that participation in collective marketing groups in Thailand encouraged greater involvement in agricultural programs by strengthening group solidarity and shared goals. Kyaw et al. (2018) also emphasize the role of local networks in bridging information and resource gaps.

Nonetheless, community influence can also constrain adoption. Martey et al. (2014) and Wiredu et al. (2013) note that entrenched norms or traditions may discourage farmers from embracing new practices, especially if innovations are perceived as conflicting with existing cultural practices.

More recent studies reinforce these dual dynamics. Le Canh Bich Tho et al. (2021) highlight the importance of farmer associations and cooperatives in facilitating technology adoption by offering institutional support and peer learning. Nguyen Nguyen et al. (2024) underscore the critical role of social capital in fostering trust and collective decision-making, which accelerates adoption of sustainable practices. However, Yunxiao Bai et al. (2024) warn that subjective norms can also perpetuate resistance if community members collectively prefer traditional methods.

In sum, community environments are both enablers and barriers: they can mobilize farmers toward collective adoption or reinforce resistance to change, depending on prevailing cultural and social dynamics.

Conclusion

This paper was reviewed to examine the factors influencing rice farmers' participation in agricultural development programme. Through an analysis of existing literature, it sought to identify key determinants that affect farmers' decisions to engage in such initiatives. From this study, it can be concluded that a deep understanding of the factors that influence the participation of rice farmers in agricultural development programs is important for increasing the impact and effectiveness of the programs. Factors such as demographic, economic, social, and psychological factors have been identified as important elements that influence rice farmers' decisions to participate in the programs. In addition, risk management, the introduction of new agricultural technology, as well as support and incentives from the government also play an important role in increasing the participation of rice farmers in agricultural development programs. With a deeper understanding of these factors, we can plan more effective strategies to increase the participation of rice farmers in agricultural development programs, as well as ensure a continuous positive impact on the agricultural community and the country as a whole.

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