



Analysis of Pig Farming Productivity and the Perceptions of Farmers Towards Government Support Policies in the Mekong Delta, Vietnam

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Abstract | Pig farming is a vital agricultural production sector in Vietnam. This study involved 260 pig farmers from two provinces in the Mekong Delta. We employed binary logistic regression to evaluate pig productivity on farms and the effects of social characteristics and support policies on this productivity. The results showed that farmers were, on average, 50 years old and mainly males who participated in production activities. Farmers reported having completed high school, with pig farming as their primary occupation, averaging 10 years of experience. Farmers primarily raised finishers using crossbreeds, predominantly produced on-site. The average number of pigs on the farm was approximately 30. Farmers recognized the livestock support policy across almost all criteria, with the highest recognition for financial support policies. The results also showed that most surveyed farms deemed pig farming practical. In addition, the variables of social profiles (age, education, main occupation, and experience) and financial support policies had positive and significant impacts on pig farming productivity. In conclusion, pig farm productivity in the Mekong Delta is positively influenced by both social profiles and government support policies.

Keywords | Pig farm, Farming productivity, Socio-economic, Government support policy, Mekong Delta

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INTRODUCTION

Pig farming is a crucial sector of the Vietnamese economy that contributes considerably to livestock production. Pig farmers derive approximately 80% of their overall revenue from production activities at the household level (Huong *et al.*, 2023). Conventional farming contributes substantially to the economic growth of rural and suburban

regions. However, the pig-farming sector faces numerous obstacles that necessitate immediate and comprehensive remedies. Diseases, such as African Swine Fever (ASF), continue to affect small-scale pig production. The income variation attributed to ASF ranged from -0.30 to -0.45% in rural areas, while the market price of live meat increased from US\$ 1.61/kg live weight following the first ASF outbreak and subsequently decreased to US\$ 1.39/kg. The increased

production costs resulting from the epidemic severely impact the profitability of livestock farmers (Nguyen-Thi *et al.*, 2021). Although small-scale swine producers can enhance their productivity, they face challenges in attaining greater market competitiveness owing to various factors, including market saturation (Savagar *et al.*, 2024), price volatility (Qui *et al.*, 2020), and limited access to quality markets.

Previous studies indicate that livestock farming efficiency is affected by numerous factors, including internal factors, such as demographics, and external factors, such as support policies. According to Qui *et al.* (2020), the external factors impacting farming efficiency in a province in the Mekong Delta, Vietnam, include feed prices, capital, diseases, and markets. In addition, the research of Phung and Dao (2024) indicates that many complex factors affect the decisions of farmers to apply sustainable agricultural development policies. These factors include socioeconomic status, demographic characteristics, and access to institutional services, thereby ultimately influencing the profitability and efficiency of livestock farming. Despite implementing various policies aimed at assisting pig farmers, such as loan support, provision of new breeds, and technology transfer, the actual effectiveness of these measures in small-scale pig-farming households remains limited. Implementing control and restrictions on unregistered farms presents considerable challenges. Difficulties in regulating traditional markets and using veterinary services of unknown origin pose substantial challenges for the pig farming industry. Moreover, reliance on traditional agriculture and wet markets poses health hazards stemming from insufficient sanitation, limits market access due to subpar product standards and compliance issues, and results in income instability (Nguyen Thi Thuy *et al.*, 2020). In contrast, contemporary agriculture improves effectiveness, minimizes expenses, and enhances animal well-being and health, thereby maximizing resource exploitation and overall farm management (Norton *et al.*, 2019). The study indicates interest in and outlines strategies for improving pig farming by transitioning from traditional small-scale operations to more advanced medium- and large-scale farms. However, the accessibility of these development policies to small-scale pig farmers requires further investigation.

Nguyen *et al.* (2023) indicated that financial issues affected farm development. According to Bai *et al.* (2019), animal husbandry was closely linked to domestic policies, which directly influenced the development of pig herds and pig farm efficiency. In addition, Roessler *et al.* (2016) indicated that farmers possessing higher education and knowledge had better farm management abilities, leading to enhanced efficiency in animal husbandry. Vu *et al.* (2019) showed that sociological and educational factors were closely associated with animal husbandry efficiency. Other factors, such as the technical efficiency of animal husbandry and capi-

tal, affect agricultural productivity. In addition, Vietnamese pig farming productivity remains low compared to that of other countries in the region and worldwide. Vietnamese farmers typically allocate approximately 5.8 months for the fattening of hogs (Takahashi *et al.*, 2020), resulting in higher production costs. Extensive infrastructural development, technical support, technological exposure, significant financial investments, and the deployment of precision-farming equipment are essential (Sharifuzzaman *et al.*, 2024).

In addition, studies on pig farming productivity or the perceptions of farmers regarding policies in the Mekong Delta remain lacking. Farmers should recognize the support policies and leverage them to improve production efficiency on their farms. Therefore, this study aimed to assess the relationship between pig farming productivity and farmers' perceptions of support services in the Mekong Delta, Vietnam.

MATERIALS AND METHODS

LOCATION AND TIME

The study was conducted from February to June 2024 in the Tra Vinh and Ben Tre provinces of the Mekong Delta. The study was conducted in these two provinces with populations of 249.9 and 335.6 thousand pigs, respectively (GSO, 2023). This was because of their relatively high pig numbers and dynamic pig farming and trading activities. The research locations are shown in Figure 1.

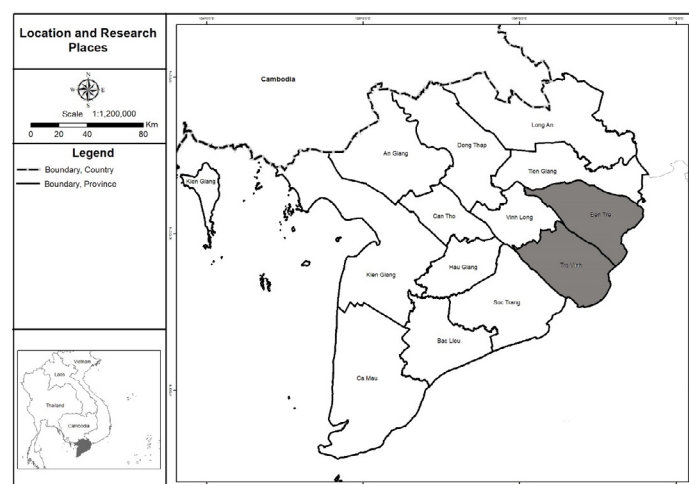


Figure 1: Research locations.

DATA COLLECTION

The data collection sites were selected using a random sampling method, focusing on the Tra Vinh and Ben Tre provinces. For the research sample, 270 farmers were selected from these provinces. The reliability of the study was enhanced by implementing 270 samples. We surveyed 270 farmers, comprising 30 samples from each of the three districts per province. However, ten farmers provided insufficient data and failed to meet the survey cri-

teria. Consequently, 260 samples were used in this study. Farmers were selected based on the following criteria: (1) farmers possessed five or more years of experience in pig farming. According to research by [Qui et al. 2020, 2021](#), farmers possessing five or more years of experience possess fundamental knowledge and awareness of pig farming and farm business operations; (2) farmers were raising ten or more pig units. This selection was based on these farmers demonstrating a greater concern for their farms and a more business-oriented approach to farm management. [Levine and Stephan \(2010\)](#) indicate that a minimum of 30 samples is sufficient to process statistical data in contexts with unknown populations. In addition, the study used a multiple-choice questionnaire, which was conducted in Vietnamese and translated into English after the survey ([Qui et al., 2020](#)). Data were collected in three main stages.

- Part 1: Demographic data, including age, gender, labor, experience, education, and primary occupation.
- Part 2: Data on the production capacity of the farm, including the number of piglets, sows, and finishers; raising time; number of pig litters per year; and distance to the market.
- Part 3: Data on support policies/services, following the statements of [Lencucha et al. \(2020\)](#), including input support (five statements), output support (three statements), technical support (five statements), and financial support (three statements). Farmers rated the support policies on a scale of 1 to 5, ranging from strongly disagree to strongly agree.

DATA ANALYSIS

We evaluated the variables using descriptive and binary regression methods ([Figure 2](#)). Data were processed descriptively using SPSS (version 26.0; IBM Corp., Armonk, NY, USA). [Table 1](#) presents the variables used in the questionnaire. Additionally, this study tested the reliability of the survey variables based on Cronbach's alpha. The Cronbach's alpha of the study was 0.791, indicating good reliability.

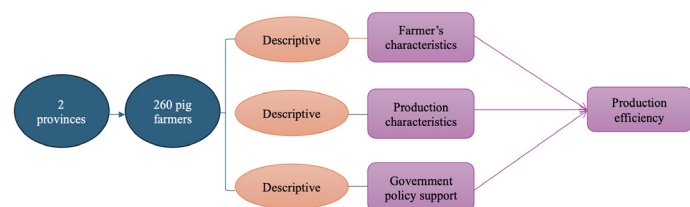


Figure 2: The conceptual framework of the study.

This study employed five questions to assess the input support material indicator, three questions to evaluate the output support indicator, five questions to evaluate the technical support indicator, and three questions to assess the financial support indicator to determine people's perceptions of support services and policies. All questions were checked for reliability and validity before analysis.

Table 1: Definition and classification of variable meanings in the study.

Variable name	Definition
Social variables	
Age	The years calculated from the birth of farmers (as a continuous variable, years)
Gender	The gender refers to role and sex characteristics of farmers, with gender operationalized as a dummy variable (with 1 = male and 0 = female)
Education	The formal educations that farmers completed. Educational level is determined by a categorical variable (1 = primary school, 2 = secondary school, 3 = high school, and 4 = university degree or higher)
Main occupation	The main income-generating occupation of the household head, using a categorical variable (1 = pig farming as the main occupation, 0 = pig farming as a side occupation).
Experience	The experience refers to the years that farmers worked at the pig farm. It was calculated from the time of participating in pig rearing to the present (determined by continuous variable).
Labor	Number of workers participating in production activities at the pig farm, using a continuous variable.
Perception variables	
Input support materials	Farmer's perception of input support related to raw materials, equipment, tools, feed, etc., using a variable rating from 1 to 5
Output support	Farmer's perception of output support related to farm production, using a variable rating from 1 to 5
Technical support	Farmers' perception of support related to production techniques and farm management, using a variable rating from 1 to 5
Financial support	Farmer's perception of financial support capital, using a variable rating from 1 to 5
Farm productivity	The farm's production efficiency. When the farm's productivity ratio is higher than 1, it means the farm is operating effectively, using the dummy variable with 1 = efficiency and 0 = inefficiency

Productivity in pig production was calculated using the variables listed in [Table 2](#). According to [Zelenyuk \(2023\)](#), farming productivity is typically assessed by examining the ratio of output to input in economics; however, this is not always the case. In the case of a single output (y) generated from a single input (x), farming productivity can be easily comprehended. This can be expressed precisely as the ratio of the output to the input. This measure is referred to as single-factor productivity. It can be calculated at a specific time t using Eq. (1):

$$\text{Pig farming productivity} = \frac{y_t}{x_t} \quad (\text{Eq. 1})$$

Table 2: Definitions of pig production-related variables used in the study.

Production Unit		Descriptive indicators
Productivity variables		
Number of pigs	Heads	Number of pigs, including piglets, sows, and finishers
Type of pig breed		Types of pig breeds raised at surveyed farms
Distance to market	km	Distance from the pig farm to the nearest market that sells and trades pig/pork-related products
Production outputs		
Marketed pig price	VND	Average revenue for all fattening pigs sold per cycle
Production inputs		
Feed	VND	The average expense for purchasing feed per cycle
Piglet price	VND	The average expense for purchasing piglets per cycle
Vet service price	VND	The average expense for vet services per cycle
Electricity and water	VND	The average expense for electricity and water per cycle

The index that quantifies productivity changes in these simple environments can then be defined as the ratio of single-factor productivity over a specific period; it can be restructured as the ratio of the output index to the input index, Eq. (2):

$$\text{Pig farming productivity} = \frac{\text{Output}}{\text{Input}} \quad (\text{Eq. 2})$$

After calculating the productivity of the pig farm using Eq. 2, the study converted this into production efficiency, where a ratio > 1 indicated efficiency and a ratio ≤ 1 indicated inefficiency.

In addition, the data were processed using the binary logistic regression (BLR) method to evaluate the impact of the independent variables X ($n = 1, \dots, n$) on the dependent variable Y in the study, as expressed in Eq. (3):

$$\log\left(\frac{P}{1-P}\right) = Y = b_0 + b_1X_1 + b_2X_2 + \dots + b_iX_k \quad (\text{Eq. 3})$$

where;

$\log\left(\frac{P}{1-P}\right)$ or Y is the probability of the formula.

X is the predictor/independent variable.

b is the regression coefficient.

In this study, the dependent variable (Y) is the productivity of the pig farm, which is calculated and converted into

a dummy variable after calculating the farm's production productivity (efficiency or inefficiency). The independent variable X_n includes X_1 , age; X_2 , gender; X_3 , labor; X_4 , experience; X_5 , education; X_6 , main occupation; X_7 , pig unit; X_8 , distance to the market; X_9 , input support materials; X_{10} , output support; X_{11} , technical support; X_{12} , financial support. From the above variables and Eq. (3), we can establish a specific formula (Eq. 4):

$$Y_e = b_0 + b_1X_1 + b_2X_2 + \dots + b_{12}X_{12} \quad (\text{Eq. 4})$$

Where,

Y_e is the probability of farm efficiency, which indicates efficiency or inefficiency.

X_1 to X_n are the independent variables, as mentioned above. b is the regression coefficient.

The BLR in this study explored the effect of independent variables, including age, gender, labor, experience, education, main occupation, pig unit, distance to the market, input support materials, output support, technical support, and financial support, on the dependent variable of farm efficiency. The results indicated that variations in one of the dependent variables corresponded to changes in pig farm production efficiency.

Table 3: Social information of pig farmers.

Criteria	Categories	Results	
		N	Percentage
Age		50.20 ± 7.260	
Gender	Female	37	14.2
	Male	223	85.8
Labor		1.50 ± 0.606	
Experience		10.78 ± 6.865	
Education	Primary school	14	5.4
	Secondary school	52	20.0
	High school	181	69.6
	Bachelor	13	5.0
Main occupation	Off-farm jobs	43	16.5
	Raising pigs	217	83.5
Pig unit		28.595 ± 34.289	

RESULTS AND DISCUSSION

SOCIAL PROFILES AND PRODUCTION CHARACTERISTICS OF PIG FARMS IN THE MEKONG DELTA, VIETNAM

Table 3 shows that farmers with an average age of 50 years were dominant under Vietnamese regulations, with male farmers accounting for more than 85% of the total. The study recorded that most farmers had completed high school. Farmers also reported an average of more than ten years of experience and 1.5 laborers/farm. Over 80% of the

respondents indicated that farmers engaged in pig farming as their main occupation, with an average of 30 pigs per farm. This study was similar to that of [Guntoro et al. \(2023\)](#) and [Qui et al. \(2020\)](#), which advocated for the prioritization of sociological information in evaluating influencing factors. Sociological factors also affect the number of pigs raised on farms, which is partly related to farm productivity. In this study, the characteristics of the farmers were similar to those of the farmers evaluated in comparable studies in the Mekong Delta ([Qui et al., 2020](#); [Qui et al., 2021](#); [Qui et al., 2024a](#); [Qui et al., 2024b](#)).

Table 4: Small pig farm production characteristics.

Production characteristics	Categorical	Results	
		N	%
Pig breeds	Yorkshire	9	3.5
	Landrace	4	1.5
	Duroc	18	6.9
	Mixed breed	229	88.1
Piglet source	Company/other farms	46	17.7
	Import	1	0.4
	Produced pig at the farm	102	39.2
	Both buying and producing at a farm	111	42.7
Piglet number	Heads	33.24 ± 60.18	
Sow number	Heads	7.370 ± 11.52	
Finisher number	Heads	63.90 ± 126.1	
Raising time	Months	5.050 ± 0.616	
Production cycle	Per year	2.133 ± 0.371	
Market distance	Km	3.468 ± 1.915	

Table 4 shows that most farms did not use pure breeds. Farmers raised 39.2% of their pigs through self-production; some declared producing on their farms while also purchasing from external sources. Farmers sold their pigs more than two times per year with an average raising time of 5 months. Besides, the average distance from the farm to the market was approximately 3 km. Most farms raised finishers, with more than 63 heads per farm. Piglets and sows were also available at the farm, with an average of 33 and 7 heads per farm, respectively.

Table 5 indicates that the average selling price of live pigs during the survey fluctuates around 5 million VND. Feed, piglet price, electricity, water, and veterinary costs accounted for more than 90% of the total cost associated with selling live pigs. After selling, profits continued to be recorded in livestock households. In addition, over 80% of livestock farmers recorded the production efficiency of their pig farms (Figure 3).

The results in Tables 4 and 5 show that farm productivi-

ty during the survey period was considered adequate and profitable for pig farmers. Furthermore, the survey data indicated that, according to [GSO \(2024\)](#), there were considerable increases in pig output, pork product output, and pig farm productivity in the first six months of 2024. In particular, pig prices were observed to increase compared with the corresponding period. Production achieved higher economic efficiency by decreasing the scale of small farm production while simultaneously increasing the large-scale farming of livestock enterprises, which incurred lower production costs. In addition, pig prices increased by 10,000–11,000 VND/kg. An increase in pig herd productivity can be viewed from the perspective of raising time and breeding stock. Compared with the study by [Takahashi et al. \(2020\)](#), the increased costs associated with raising pigs, attributed to prolonged raising periods, were also partly linked to animal productivity. However, the average rearing time of a litter of pigs decreased from 5.8 months in a previous study by [Takahashi et al. \(2020\)](#) to just over five months in this study. This showed that the optimization of rearing time resulted in a greater number of pig litters produced during the rearing period.

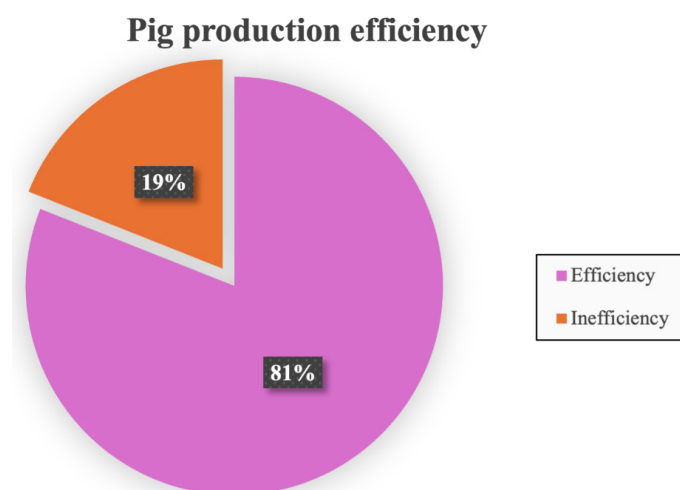


Figure 3: Production efficiency of pig farms in Mekong delta.

Table 5: Productivity of pig farms in the surveyed area.

Criteria	Categories	Results	
		N	%
Total of marketed pig's price		5.149.026 ± 425.545	
Total of feed		3.452.444 ± 285.800	
Total piglet price		998.000 ± 258.009	
Total vet price		169.913 ± 108.193	
Total of electric city and water		58.146 ± 26.227	

Moreover, breeding stock and diseases were among the factors affecting farm productivity and income ([Nguyen-Thi et al., 2021](#)). The results showed increases in the use of both imported and native breeding stocks, suggesting that disease resistance and control might be of considerable interest

Table 6: Perceptions of farmers towards support services in the Mekong Delta, Vietnam.

No	Statements	Degree of perception towards support services				
		1	2	3	4	5
1	Input Support Materials					
	1. Feed is easy to buy in the area	-	0.8	8.8	89.6	0.8
	2. According to government policy, vaccines should be used on a farm	0.4	27.7	35.0	35.8	1.2
	3. The government provides support prices to use machinery at the farm	0.8	30.0	42.7	25.0	1.5
	4. Instruments for pig production are easy to access in your area	1.9	25.0	33.1	39.2	0.8
	5. Production materials, such as drugs, vaccines, and disinfectants, are supported by the government when available	1.9	24.6	35.0	37.3	1.2
	Average		3.239	0.585		
2	Output Support					
	1. Price support from the government is available when hog prices are low or a pig epidemic occurs	1.2	26.5	26.5	43.8	1.9
	2. Government gives advice in expanding pig herds	1.2	26.2	31.9	37.7	3.1
	3. Pigs could not be sold and should be burned when suspected of disease.	-	3.1	6.2	88.1	2.7
	Average		3.415	0.567		
3	Technical Support					
	1. Road is expanded to ease the pig movement when selling	-	2.3	9.2	84.6	3.8
	2. The officers always help when there are problems	0.8	8.8	46.2	41.9	2.3
	3. Training for pig production from the officers is useful	-	3.8	41.9	50.8	3.5
	4. Prevention practice to avoid disease outbreaks is performed by officers	-	0.8	41.2	55.4	2.7
	5. Environment issue support from the officer, such as biogas	-	-	9.2	87.7	3.1
	Average		3.667	0.349		
4	Financial support					
	1. It is easy to access loans for pig production	3.1	4.6	12.7	74.2	5.4
	2. No interest when farmers have access to financial support	3.5	5.8	15.8	60.0	15.0
	3. Free vaccinations/disinfectants for some common diseases	-	0.8	15.8	81.9	1.5
	Average		3.785	0.559		

to pig farmers. Furthermore, previous studies indicate that domestic breeds, while exhibiting good adaptability to environmental conditions, have not yet met production requirements related to growth and reproduction (Dang-Nguyen *et al.*, 2010) or achieved high economic efficiency.

PERCEPTIONS OF FARMERS TOWARDS SUPPORT POLICY IN THE MEKONG DELTA, VIETNAM

Table 6 presents support policies for pig farmers. The table shows that most pig farmers had a high average score in terms of their perceptions toward support policies. The perception of financial support received the highest score. Regarding input support policies, most farm owners perceived feed procurement in the area as straightforward, whereas other input-related issues were less concerning for farmers. Regarding output, most farmers were aware that they should not sell sick pigs externally. In addition, many farmers possessed knowledge regarding road infrastructure and environmental issues, with more than 80% of respondents stating that most pig farmers were particularly cognizant of policies related to loans, interest rates, vaccines, and disinfectants.

Table 7: Effects of social profile and the perceptions of farmers towards support on production efficiency.

Criteria	Regression analysis				
	B	S.E.	Wald	Sig.	Exp(B)
Age	-0.065	0.029	4.981	0.026	0.937
Gender					
Male	-0.155	0.564	0.075	0.784	0.857
Labor	0.380	0.370	1.058	0.304	1.463
Education					
Secondary school	1.331	0.942	1.997	0.158	3.786
High school	1.968	0.935	4.429	0.035	7.157
Bachelor	1.834	1.247	2.163	0.141	6.259
Main occupation					
Pig farming	-2.080	0.843	6.093	0.014	0.125
Experience	0.120	0.044	7.479	0.006	1.127
Market distance	0.240	0.176	1.861	0.172	1.271
Pig unit	0.001	0.007	0.010	0.922	1.001
Input support materials	0.742	0.561	1.747	0.186	2.100
Output support	-0.837	0.541	2.397	0.122	0.433
Technical support	-0.630	0.920	0.469	0.494	0.533
Financial support	1.557	0.451	11.908	0.001	4.745
Constant	-0.548	3.458	0.025	0.874	0.578

Noted: $R^2 = 0.27$; $\text{sig.} = 0.000$.

Support services for pig-farming activities were implemented across various dimensions and reflected in the perceptions of farmers regarding inputs, outputs, and technical and financial support. This study recorded that support services, such as biogas, were effectively implemented to assist

farmers. Dinh *et al.* (2021) indicated that biogas deployment not only protected the environment but also contributed to environmental protection and reduced livestock production costs by enabling electricity and heat generation for pig production. High-scoring perception indicators were present because farmers could access government support. For example, the government implemented strategies, such as genetic enhancement, pricing regulation, product safety assessment, and attracting major high-tech corporations, to meet domestic needs and increase exports. Interest rates on loans provided to enhance animal genetics and promote artificial insemination for genetic improvement have decreased (Sharifuzzaman *et al.*, 2024).

EFFECT OF SOCIAL PROFILES AND PERCEPTIONS ON PRODUCTIVITY

Table 7 illustrates the influence of age, gender, labor, education, primary occupation, experience, distance to the nearest market, number of pigs, and support policies on increasing pig farming efficiency in the Mekong Delta. The model explained 27.0% (*Nagelkerke R*²) of the variance in production efficiency and correctly classified 73.0% of the cases. Decreasing age correlated with an increased likelihood of increasing farm efficiency, whereas more experience was associated with an increased likelihood of increasing efficiency. Similarly, the study recorded that increased financial support correlated with an increased likelihood of farm efficiency. Farmers with a high school education exhibited a 7.157-fold increase in farm efficiency relative to those with only a primary school education. Raising pigs as the primary occupation decreased farm efficiency by 0.125 times. Based on these results, the formulation can be expressed as follows:

$$Y = (-0.065) \times \text{age} + 1.968 \times \text{high school} + (-2.080) \times \text{pig farming} + 0.120 \times \text{experience} + 1.557 \times \text{financial support}.$$

Age, experience, education, and primary occupation affected pig farm productivity in the Mekong Delta. This is consistent with the results of previous studies (Phung and Dao, 2024; Roessler *et al.*, 2016; Vu *et al.*, 2019). In particular, the age of the farmers decreased, leading to an increase in livestock productivity. This indicated that young farmers positively affected farm productivity. This is similar to the findings of Liu *et al.* (2023), who stated that age had a negative impact on agricultural production and profits. The labor force and cognitive abilities of young farmers were higher. Young people were also more likely to access emerging science and technology, enabling them to implement advancements and utilize these innovations in their farming practices. In addition, the difficulty of changing the perceptions and decisions of older farmers partly affected farm productivity. For example, farmers used natural resources available on their farms when feed was insufficient to meet nutritional requirements (Linh *et al.*, 2022),

potentially resulting in reduced productivity. In contrast, the younger group tended to experiment more with new methods to improve farm productivity. This was also emphasized in a study by Bianchi *et al.* (2022), which suggested that young farmers tended to promote innovation in agriculture, thereby improving farm productivity.

Increased experience enabled farmers to enhance farm management, leading to higher productivity. According to Qui *et al.* (2021), experience helps farmers avoid disease risks and improves livestock productivity. Farmers with more experience developed various measures to mitigate diseases and improve animal production efficiency, acquired through their farming process. Individuals were motivated to engage in agricultural pursuits based on their farming experience. A greater number of individuals involved in farming correlated with an increased perception of its advantages relative to purchasing everything from the market (Siphesihle and Lelethu, 2020). Consequently, farmers had higher profits and improved farm input profits.

Education behaved similarly to the experience indicator in this study; improving farm productivity was also related to education. In this study, farmers with a high school education generally managed farms with higher productivity than those with only a primary education, suggesting that enhanced education contributed to increased farm productivity. This result is similar to that of a previous study, which indicated that education was closely related to livestock efficiency. It provided basic knowledge to apply or learn other issues related to techniques or farm management (Vu *et al.*, 2019). According to Piñeiro *et al.* (2020) and Chams and García-Blandón (2019), farmers who possessed higher levels of education, actively sought information on potential innovations, had positive attitudes towards sustainability, followed social norms, and felt in control of adopting new practices and felt more inclined to participate in the adoption process of innovations within the agri-food sector, thereby improving farm productivity. Siphesihle and Lelethu (2020) suggested that ten years of schooling could help farmers understand farm operations and information access methods. Moreover, the achievement of optimal agricultural productivity was based on the education of rural farmers, enabling them to comprehend and embrace complex scientific advancements that might pose challenges for those lacking formal education in rural areas (Biru and Korgitet, 2019).

Occupation was also a significant factor affecting farm productivity. In this study, people whose primary occupation was pig farming often exhibited reduced farming efficiency. This could be explained by farmers concentrating solely on farming practices, resulting in limited time for engaging with technology and market information, as well as conducting less research and acquiring new knowledge

to support agricultural activities. In the study by [Qui *et al.* \(2021\)](#), it was pointed out that the information sources and channels that were accessed required a lot of time for consultation and research. In addition, engaging in other jobs partly supported the farmers by providing more information sources through friends, books, and social activities. Moreover, [Tran \(2015\)](#) showed that engaging in non-farming occupations increased the incomes of farmers, potentially leading to increased investments in technology or capital. This would later be beneficial for improving the efficiency of agricultural land production.

In this study, support policies, such as input, output, and technical support, did not impact farm productivity. However, farmers considered financial policies more effective and supportive. This could be explained by the fact that input, output, and technical policies were also influenced by many different factors, such as the market, individual qualifications of farmers, and other external factors (e.g., culture and customs). The study by [Nguyen *et al.* \(2023\)](#) indicates that the perception of financial support influenced farm development, particularly through financial support services. Financial policy support partly reduced the capital burden faced by farmers operating farms. For example, farmers operating within the agricultural sector could obtain interest-free loans from the government. In addition, financing was the first and foremost issue in investing in farm equipment, technology, and innovation.

In the context of agricultural production, [Zabatantou *et al.* \(2023\)](#) argued that access to financing, including loans, facilitated the transformation of techniques and technologies, thereby increasing production capacity on farms. In addition, financial factors also contributed to facilitating learning and exploring new methods to apply on farms, thereby supporting the improvement of farm productivity. According to [Fowowe \(2020\)](#), credit provision facilitated the purchase of inputs and employment of labor and machinery, thereby sustaining the production cycle. Furthermore, financial inclusion promoted resilience and prevented individuals from falling into poverty traps. The research revealed that the amount of money saved by those with low income exceeded the amount of credit they earned. Savings facilitated interest-free investments, allowing farmers to pursue innovation without the burden of interest payments. In addition, savings provide a safeguard against unexpected events, such as adverse weather conditions or times of low agricultural yield. Insurance against agricultural risks, including weather variability, crop yield fluctuations, and livestock mortality, would significantly contribute to financial inclusion, mitigate poverty traps, and boost resilience ([Fowowe, 2020](#)).

CONCLUSIONS AND RECOMMENDATIONS

Pig farmers in the Mekong Delta were predominantly male, and pig farming was their primary occupation. Most farmers had attained a high school education and were self-employed within farm production. The study also showed that farmers were highly aware of pig farming support policies, including input, output, and technical and financial support. In addition, various social factors, such as age, experience, education, occupation, and financial support policies, need to be considered to increase pig farming productivity. Further strategies to improve farm productivity should focus on social profiles and government financial support policies. This study lacked information on the role of non-financial support and the impact of pig breed choice on productivity.

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NOVELTY STATEMENT

This study focused on pig farmers in the Mekong Delta, for whom information may be lacking. To the best of our knowledge, this is the most recent study focusing on pig farm competitiveness and the factors affecting it in the Mekong Delta, Vietnam.

AUTHOR'S CONTRIBUTIONS

Conceptualization, Nguyen Hoang Qui, Budi Guntoro, and Ahmad Romadhoni Surya Putra; Methodology, Nguyen Hoang Qui and Budi Guntoro; Software, Nguyen Hoang Qui and Nguyen Thi Anh Thu; Validation, Nguyen Hoang Qui, Budi Guntoro, and Ahmad Romadhoni Surya Putra; Formal Analysis, Nguyen Hoang Qui; Investigation, Nguyen Thi Anh Thu, Nguyen Thuy Linh, and Noemi C. Liangco; Writing – Original Draft Preparation, Nguyen Hoang Qui; Writing – Review and Editing, Nguyen Hoang Qui, Budi Guntoro and Ahmed Romadhoni Surya Putra; Supervision, Budi Guntoro, Ahmad Romadhoni Surya Putra, and Nguyen Thuy Linh.

CONFLICT OF INTEREST

There was no conflict of interest.

- Bai Z, Zhao J, Wei Z, Jin X, Ma L (2019). Socio-economic drivers of pig production and their effects on achieving sustainable development goals in China. *J. Integr. Environ. Sci.*, 16(1): 141-155. <https://doi.org/10.1080/1943815X.2019.1671463>
- Bianchi M, Bava L, Sandrucci A, Tangorra F, Tamburini A, Gislon G, Zucali M (2022). Diffusion of precision livestock farming technologies in dairy cattle farms. *Animal*, 16(11): 100650. <https://doi.org/10.1016/j.animal.2022.100650>
- Biru HS, Korgitet HS (2019). The effect of farmers education on farm productivity: Evidence from small-scale maize producing farmers in North Bench District, Bench Maji Zone. *Res. Humanit. Soc. Sci.*, 9(17): 26-34. <https://doi.org/10.7176/RHSS/9-17-04>
- Chams N, García-Blandón J (2019). On the importance of sustainable human resource management for the adoption of sustainable development goals. *Resour. Conserv. Recycl.*, 141109-122. <https://doi.org/10.1016/j.resconrec.2018.10.006>
- Dang-Nguyen TQ, Tich NK, Nguyen BX, Ozawa M, Kikuchi K, Manabe N, Ratky J, Kanai Y, Nagai T (2010). Introduction of various Vietnamese indigenous pig breeds and their conservation by using assisted reproductive techniques. *J. Reprod. Dev.*, 56(1): 31-35. <https://doi.org/10.1262/jrd.09-165k>
- Dinh DT, Do TN, Trinh AD, Pham NB, Le TT (2021). Utilization of biogas as an untapped renewable energy source in Vietnam. *Econ. Policy Energy Environ.*, 2021(1): 105-120. <https://doi.org/10.3280/EFE2021-001006>
- Fowowe B (2020). The effects of financial inclusion on agricultural productivity in Nigeria. *J. Econ. Dev.*, 22(1): 61-79. <https://doi.org/10.1108/JED-11-2019-0059>
- GSO (2023). Statistical Year Book of 2023. Statistical Publishing House, Hanoi.
- GSO (2024). Socio-economic situation report in the first quarter of 2024. <https://www.gso.gov.vn/en/data-and-statistics/2024/04/socio-economic-situation-report-in-the-first-quarter-of-2024/>
- Guntoro B, Triatmojo A, Ariyadi B, Qui N (2023). Risk analysis in cattle farmers' prevention practices of anthrax and foot and mouth disease in yogyakarta province, Indonesia. *Adv. Anim. Vet. Sci.*, 11(6): 987-997. <https://doi.org/10.17582/journal.aavs/2023/11.6.987.997>
- Huong LTT, Takahashi Y, Duy LV, Chung DK, Yabe M (2023). Development of Livestock Farming System and Technical Efficiency: A Case Study on Pig Production in Vietnam. *J. Fac. Agric. Kyushu Univ.*, 68(1): 79. <https://doi.org/10.5109/6770291>
- Lencucha R, Pal NE, Appau A, Thow AM, Drope J (2020). Government policy and agricultural production: a scoping review to inform research and policy on healthy agricultural commodities. *Globalization and health*, 16(1): 11.
- Levine DM, Stephan DF (2010). Even you can learn statistics: A guide for everyone who has ever been afraid of statistics. 2nd ed. USA: FT Press, New Jersey.
- Linh NT, Dong NTK, Thu NV (2022). A survey of Muscovy duck production in rural areas of Tra Vinh Province, Vietnam. *J. Indones. Trop. Anim. Agric.*, 47(2): 138-145. <https://doi.org/10.14710/jitaa.47.2.138-145>
- Liu J, Fang Y, Wang G, Liu B, Wang R (2023). The aging of farmers and its challenges for labor-intensive agriculture in China: A perspective on farmland transfer plans for farmers' retirement. *J. Rural Stud.*, 100103013. <https://doi.org/10.1016/j.jrurstud.2023.103013>
- Nguyen TT, Nguyen TT, Grote U (2023). Credit, shocks and production efficiency of rice farmers in Vietnam. *Econ. Anal. Policy*, 77780-791. <https://doi.org/10.1016/j.eap.2022.12.018>
- Nguyen TTM, Dorny P, Lebailly P, Le TMC, Nguyen TTH, Dermauw V (2020). Mapping the pork value chain in Vietnam: a systematic review. *Trop. Anim. Health Prod.*, 52(6): 2799-2808. <https://doi.org/10.1007/s11250-020-02338-y>
- Nguyen-Thi T, Pham-Thi-Ngoc L, Nguyen-Ngoc Q, Dang-Xuan S, Lee HS, Nguyen-Viet H, Padungtod P, Nguyen-Thu T, Nguyen-Thi T, Tran-Cong T (2021). An assessment of the economic impacts of the 2019 African swine fever outbreaks in Vietnam. *Front. Vet. Sci.*, 8686038. <https://doi.org/10.3389/fvets.2021.686038>
- Norton T, Chen C, Larsen MLV, Berckmans D (2019). Precision livestock farming: Building 'digital representations' to bring the animals closer to the farmer. *Animal*, 13(12): 3009-3017. <https://doi.org/10.1017/S175173111900199X>
- Phung QA, Dao N (2024). Farmers' perceptions of sustainable agriculture in the Red River Delta, Vietnam. *Heliyon*, 10(7). <https://doi.org/10.1016/j.heliyon.2024.e28576>
- Piñeiro V, Arias J, Dürr J, Elverdin P, Ibáñez AM, Kinengyere A, Opazo CM, Owoo N, Page JR, Prager SD (2020). A scoping review on incentives for adoption of sustainable agricultural practices and their outcomes. *Nat. Sustain.*, 3(10): 809-820. <https://doi.org/10.1038/s41893-020-00617-y>
- Qui NH, Guntoro B, Syahlani SP (2020). The Social Profile, Constraints, and Its Impact on Swine Herd Size in Tra Vinh Province, Vietnam. *Trop. Anim. Sci. J.*, 43(4): 385-390. <https://doi.org/10.5398/tasj.2020.43.4.385>
- Qui NH, Guntoro B, Syahlani SP, Linh NT (2021). Factor affecting the information Sources and communication channels toward pig farmer's perception of African swine fever in Tra Vinh province, Vietnam. *Trop. Anim. Sci. J.*, 44(2): 248-254. <https://doi.org/10.5398/tasj.2021.44.2.248>
- Qui NH, Thu NTA, Linh NT (2024a). The awareness and behaviour's farmer towards highly pathogenic avian influenza prevention in Tra Vinh, Vietnam. *J. Indones. Trop. Anim. Agric.*, 49(2): 169-180. <https://doi.org/10.14710/jitaa.49.2.169-180>
- Qui NH, Thu NTA, Linh NT (2024b). Factors affecting highly pathogenic avian influenza vaccination practices at poultry farms in Tra Vinh, Vietnam. *Open Vet. J.*, 14(3): 794-804. <https://doi.org/10.5455/OVJ.2024.v14.i3.6>
- Roessler R, Mpouam SE, Muchemwa T, Schlecht E (2016). Emerging development pathways of urban livestock production in rapidly growing West Africa cities. *Sustainability*, 8(11): 1199. <https://doi.org/10.3390/su8111199>
- Savagar A, Aguda O, Galanakis Y, Wu JW (2024). Market concentration and productivity: evidence from the UK. *Fiscal Stud.*, <https://doi.org/10.1111/1475-5890.12381>
- Sharifuzzaman M, Mun HS, Ampode KMB, Laguna EB, Park HR, Kim YH, Hasan MK, Yang CJ (2024). Smart Pig Farming - A Journey Ahead of Vietnam. *Agriculture*, 14(4): 555. <https://doi.org/10.3390/agriculture14040555>
- Siphesihle Q, Lelethu M (2020). Factors affecting subsistence farming in rural areas of Nyandeni local municipality in the Eastern Cape Province. *S. Afr. J. Agri. Ext.*, 48(2): 92-105. <https://doi.org/10.17159/2413-3221/2020/v48n2a540>

- Takahashi Y, Nomura H, Van Duy L, Son CT, Yabe M (2020). Water-use efficiency of alternative pig farming systems in Vietnam. *Resour. Conserv. Recycl*, 161104926. <https://doi.org/10.1016/j.resconrec.2020.104926>
- Tran TQ (2015). Nonfarm employment and household income among ethnic minorities in Vietnam. *Econ. Res.*, 28(1): 703-716. <https://doi.org/10.1080/1331677X.2015.1087872>
- Vu V, Ho H, Le Q (2019). Impact of farmer education on production efficiency: The case of rice farms in Vietnam. *Manag. Sci. Lett.*, 9(11): 1909-1918. <https://doi.org/10.5267/j.msl.2019.6.002>
- Zabatantou LH, Bouity CA, Owonda F (2023). Impact of Agricultural Credit on Productivity. *Theor. Econ. Lett.*, 13(06): 1434-1462. <https://doi.org/10.4236/tel.2023.136081>
- Zelenyuk V (2023). Productivity analysis: roots, foundations, trends and perspectives. *J. Prod. Anal*, 60(3): 229-247.