| RESEARCH ARTICLE

THE IMPACT OF FARMER'S GROUP LEADERSHIP AND APPLICATION OF FARMING TECHNOLOGY ON VANNAME SHRIMP FARMING SUCCESS

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| ABSTRACT
Indonesia, as an agricultural country with abundant natural resources, has significant potential to improve community welfare through effective resource management. Vaname shrimp farming in Cirebon Regency, particularly in Kapetakan District, is one such commodity that boosts farmers' economies. This study, conducted at KMD Berkah Lautan from March to April 2024, used a saturated sampling technique with 65 respondents. Primary and secondary data were analyzed using correlation and path analysis. The results indicate that the leadership of leaders simultaneously influences the success of vaname shrimp farming, with Fcount = 4.267 > Ftable and a probability value (sig) = 0.019 < 0.05. However, group leadership alone does not significantly impact success, as sig = 0.229 > 0.05 and Tcount < Ttable (-1.267 < 1.670). Conversely, the application of aquaculture technology significantly affects farming success both partially and simultaneously, with sig = 0.009 < 0.05 and Tcount > Ttable (2.700 > 1.670). Additionally, there is no strong correlation between leadership and technology application, with a correlation coefficient of 0.037. In conclusion, while leadership plays a role, the application of aquaculture technology is more critical to the success of vaname shrimp farming in Kapetakan District.

| KEYWORDS
Leadership Shrimp Farming; Farming Technology Shrimp; Shrimp Cultivation Leadership

| ARTICLE DOI:

I. INTRODUCTION

Indonesia, as an agricultural country with abundant natural resources, has many islands that remain underutilized, offering significant potential to improve community welfare [1]. The marine sector holds immense potential as a source of foreign exchange and serves as a foundation for national development. With water covering 65% of Indonesia's total area and a coastline stretching 81,000 km [2], the country is rich in fishery resources. According to FAO data 2022, Indonesia has approximately 26,606,000 hectares of potential fishery resources, providing a strong foundation for fisheries development. This potential is further supported by various aquaculture systems, such as marine fish farming using the kramba system, freshwater pond systems, and brackish water pond systems [3].

The sea plays a vital role in human life, serving as a source of water through rain formation, iodine, and protein from marine commodities. Exploitation of marine resources is essential to meet human needs. In Indonesia, fishery resources are regulated under the Decree of the Minister of Maritime Affairs and Fisheries Number 19 of 2022, which estimates the sustainable potential of fish resources at 12,011,125 tons per year across various marine fisheries types. This highlights the importance of sustainable management to maximize the benefits of these resources.

The management of coastal and marine resources often leans toward centralization and scientific approaches that overlook local-level practices, known as local wisdom. These practices, rooted in ethics and morality, guide communities in making moral decisions about how to utilize natural resources and the environment sustainably [4]. One example of community empowerment in coastal

areas is through vaname shrimp farming (Litopeneaus vannamei). However, vaname shrimp production has shown fluctuations, increasing to 59,209 tons in the fourth quarter of 2021 but declining to 51,650 tons in the same period in 2022. The export volume

of Indonesian vaname shrimp reflects these trends, as illustrated in Figure 1.

FIGURE 1. EXPORT VOLUME OF INDONESIAN VANAME SHRIMP

Source: Fish Quarantine Center, Quality Control, and Safety of Fishery Products (BKIPM, 2023)

Related to this, one of the commodities that helped improve the economy of farmers in Indonesia, especially in Cirebon Regency, is the vaname shrimp commodity. Vaname shrimp is a cultured commodity that has up-and-coming prospects and returns. The increase in vaname shrimp farming is in line with the advantages of the commodity. This can be seen from the vaname shrimp which has specific characteristics, such as responsive to feed, has a high appetite, adaptive to poor environmental quality, high survival rate, a relatively short maintenance time of about 90 - 100 days per cycle, and can use a high stocking density so that it is suitable for cultivation in ponds [5].

In farming groups if vanname shrimp, the leadership impact of the group leader is crucial to ensure the application of farming technology aligns with technical standards and meets export requirements. If the group leader fails to guide members in implementing aquaculture technology effectively, production outcomes may fall short of targets, directly impacting income, which depends on both production levels and selling prices. Given this, it is essential to conduct research on leadership, the application of vaname shrimp farming technology, and their effects on the income of vaname shrimp farmers in Cirebon Regency

II. METHODOLOGY

This research was conducted at KMD Berkah Lautan, Kapetakan District, Cirebon Regency, from March to April 2024. The sampling technique used was saturated sampling. [6] saturated sampling is a sampling technique in which all members of the population are sampled. In this study, the entire population of 65 people were used as respondents. The types of data used consist of primary data and secondary data. Primary data were obtained directly from respondents through interviews using questionnaires, while secondary data were obtained indirectly from related government agencies.

The research methods used were verification (explanatory) and surveys. Data analysis was carried out using correlation analysis and path analysis. Path analysis is used to test the pattern of relationships between variables [6]. This technique aims to measure the magnitude of direct and indirect contributions indicated by the path coefficients in the causal relationship diagram between leadership variables (X1) and application of cultivation technology (X2) to the success of cultivation efforts (Y).

Data analysis was assisted by SPSS 25 software. Significance testing was carried out using the F test at a significance level of Alpha = 0.05 or $p \leq 0.05$ (sig. F), while the T test used the same significance level (sig. T). The T test is used to see the significance of the indirect influence of the independent variable on the dependent variable. The model structure and path coefficient diagram of the hypothesis are as follows:

$Y = \rho yK\ X1 + \rho yP\ X2 + \rho y\ \varepsilon$

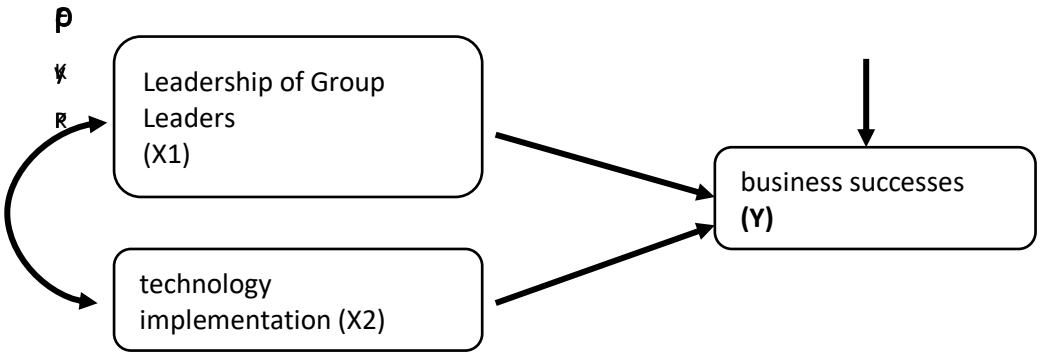


FIGURE 2. RELATIONSHIP BETWEEN RESEARCH STRUCTURES

III. RESULTS AND DISCUSSION

Testing Results of Indirect Influence

In determining whether to accept or reject Ho, we must first determine the value of the t table used. The number of df (degrees of freedom) and the level of significance to be used determine the value of the t table. The t table value is 1.670 with a significance of 5% and a large df value of n-k-1 = 65-3-1 = 61. The t-test is used for partial testing. The results of the test are in Table 1 below:

TABLE 1.
COEFFICIENTS TABLE

Variabel	Coefficient Value (t-hitung)	Sig.	T.Tabel	Keterangan
X1	1,267	0,229	1,670	Not Significant
X2	2,700	0,009	1,670	Significant

Source: Primary Data (2024)

Based on the table above, the results of each partial test can be described as follows:

The Influence of Group Leader Leadership on the Success of Vaname Shrimp Cultivation Businesses

Based on the significance value in the Coefficients table, the sig value of 0.229 is greater than 0.05, and Tcount < Ttable (-1.267 < 1.670), leading to the rejection of H0 and acceptance of H1. This indicates that the path analysis coefficient is not significant, meaning the leadership of the group leader partially has no significant effect on the success of the vaname shrimp farming business. At a 95% confidence level, the leadership of the group leader does not contribute significantly to the success of the cultivation business.

According to Falo (2016), the effectiveness of farmer groups depends on the leader's ability to mobilize members toward achieving shared goals. The leader's role in guiding and motivating members is crucial, as it influences their attitudes toward instructions and information provided. This aligns with research by Jatmika & Dewi (2020), which found that the leadership of farmer group heads in Tegallega Village significantly impacts member performance. The group head actively assists members in cultivating Pandanwangi rice, encourages participation in counseling activities, and provides continuous guidance, demonstrating the importance of strong leadership in agricultural success.

The Impact of Technology Application on the Success of Vannamei Shrimp Aquaculture

The analysis results indicate a significant influence of cultivation technology on the success of vannamei shrimp farming. Based on the Coefficients table, the significance value of 0.009 is below the 0.05 threshold, and the calculated T-value (2.700) exceeds the critical T-value (1.670). These findings confirm that the path analysis coefficient is statistically significant, demonstrating that technology adoption plays a crucial role in the success of shrimp aquaculture. At a 95% confidence level, it is evident that implementing advanced technology significantly enhances the efficiency and productivity of vannamei shrimp farming.

The application of shrimp farming technology involves utilizing development models and technology packages to enhance agricultural development. This technology must be adapted to the local agro-ecosystem, ensuring that the selected and assembled technology packages are appropriate and effective. Such packages aim to optimize natural resource management, increase productivity, improve quality, and add value to the farming process [7]. This highlights the critical role of technology in achieving successful and sustainable vaname shrimp farming.

Direct Effect Testing Results

In path analysis, the correlation coefficient (r) is needed in the calculation of path analysis. The following are the results of the correlation analysis (r) testing with SPSS 25

TABLE 2.
CORRELATION ANALYSIS

Correlations

		Leadership (X1)	Application Technology (X2)	Business Success (Y)
Leadership (X1)	Pearson Correlation	1	,037	-,138
	Sig. (2-tailed)		,777	,294
	N	65	65	65
Application Technology (X2)	Pearson Correlation	,037	1	,328*
	Sig. (2-tailed)	,777		,010
	N	65	65	65
Business Success (Y)	Pearson Correlation	-,138	,328*	1
	Sig. (2-tailed)	,294	,010	
	N	65	65	65

Source: Primary data processed (2024)

Based on the results of the correlation analysis, it show that the correlation between leadership and technology application is 0.037, then the leadership variable with business success is -0.138 and the correlation of technology application with business success is 0.328.

The next step is to calculate the path coefficient using the Linear Regression model, to find Rsquare, the F value in the Anova table and the probability value (sig). The following Linear Regression results are as follows :

TABLE 3.
MODEL SUMMARY

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,361[a]	,130	,100	2,007

a. Predictors: (Constant), Technology Implementation (X2),)

TABLE 4.
ANNOVA

ANOVA[a]

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	34,373	2	17,186	4,267	,019[b]
	Residual	229,560	57	4,027		
	Total	263,933	59			

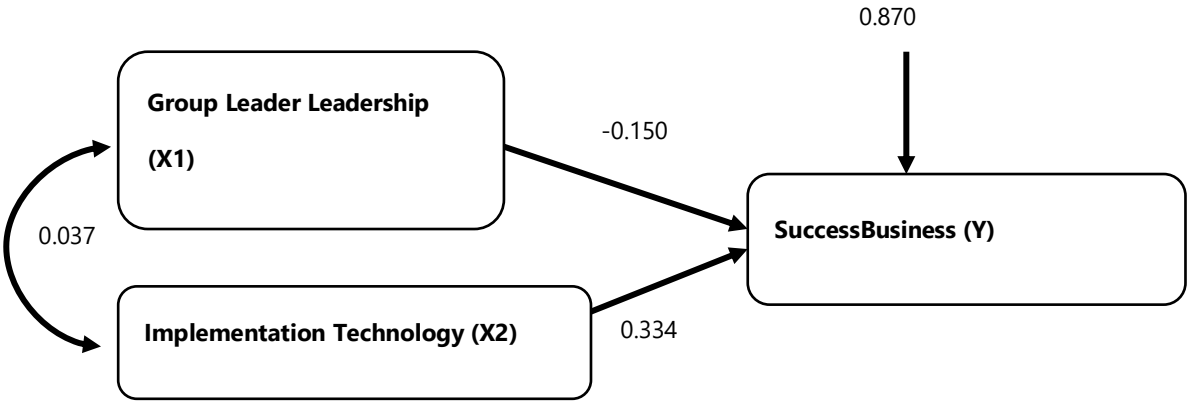
a. Dependent Variable: Business Success (Y)

b. Predictors: (Constant), Technology Implementation (X2), Leadership (X1)

The model summary analysis shows an R^2 value of 0.130, indicating that the leadership of the group leader and the application of technology contribute to the success of vannamei shrimp farming. Additionally, the ANOVA test results reveal an F-count of 4.267,

which is greater than the critical F-table value, with a significance level of 0.019. Since the significance value is below 0.05, H_0 is accepted, and H_1 is rejected, confirming that leadership and technology application significantly impact shrimp farming success. Based on these results, further individual testing can be conducted to analyze their specific effects.

To determine the contribution of other factors outside the research variables that could not be explained in this study obtained by subtracting 1 to Rsquare, namely = 1 - R2yKP = 1 - 0.130 = 0.870. After knowing the contribution of independent variables and other factors, the structural equation of this study is Y = -0.150 X1 + 0.334 X2 + 0.870 ε



According to [8], the development of the shrimp farming industry requires adequate environmental resources to produce targeted production. However, environmental conditions, both quantity and quality, are increasingly becoming limiting factors resulting in production systems tending to change from area-based aquaculture (extensification) towards improved management of aquaculture systems (intensification). The importance of the role of the leader and leadership has a considerable influence on achieving the target objectives of the group he leads [9]. The application of appropriate vaname shrimp farming technology is also expected to have high productivity and very profitable business prospects [10].

IV. CONCLUSION

Based on the results of field data analysis, hypothesis testing, and discussion, the following conclusions can be drawn: The leadership of the group leader simultaneously affects the success of the vaname shrimp farming business in Kapetakan District, as indicated by Fcount = 4.267 > Ftable and a probability value (sig) = 0.019 < 0.05. However, partially, the leadership of the group leader does not significantly impact the success of the business, with a sig value = 0.229 > 0.05 and Tcount < Ttable (-1.267 < 1.670). On the other hand, the application of aquaculture technology significantly affects the success of vaname shrimp farming both partially and simultaneously, with a sig value = 0.009 < 0.05 and Tcount > Ttable (2.700 > 1.670). Additionally, there is no strong relationship between the leadership of the group leader and the application of aquaculture technology, as shown by a correlation coefficient of 0.037.

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