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DETERMINANTS OF INCOME OF FISH PROCESSING MSME ACTORS IN PENGAMBENGAN VILLAGE, JEMBRANA REGENCY

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Abstract: The fisheries sector is one of the leading sectors in Bali Province and serves as the backbone of the local economy in Pengambengan Village, Jembrana Regency, Bali. However, it has not yet been optimally developed. This study aims to analyze the simultaneous and partial effects of business capital, education level, technology, raw materials, and working hours on the income of MSME actors in Pengambengan Village, Jembrana Regency. The research employs a quantitative associative approach with a sample of 58 fish-processing MSME actors selected through probability sampling using the simple random sampling method. Data were collected through observation and structured interviews. Data analysis was conducted using descriptive statistics, multiple linear regression, and classical assumption tests. The results of this study indicate that simultaneously, business capital, education level, technology, raw materials, and working hours have a significant effect on the income of fish-processing MSME actors. Partially, the variables of business capital, technology, raw materials, and working hours have a positive and significant effect on income, while the education level variable does not have a significant effect on income. The findings of this study imply the need for outreach regarding capital access and the use of marketing technology to enhance the productivity and welfare of fish-processing MSME actors in a sustainable manner.

Keywords: MSMEs, income, business capital, education level, technology, raw materials, working hours

INTRODUCTION

Micro, Small, and Medium Enterprises (MSMEs) play an important role in economic development through job creation, economic activity diversification, and the distribution of economic benefits from production source areas to other regions (Harvie, 2019). MSMEs in Indonesia are one of the priorities in national economic development, not only because they are the backbone of the people-based economic system aimed at reducing income inequality and differences among business actors, but also for poverty alleviation and employment absorption (Putra, 2020). MSMEs serve as one of the economic pillars in Indonesia due to their substantial contribution to improving community welfare and employment absorption. In general, MSME development plays a significant role in stimulating local economic activities and supporting the supply of goods and services from resource-rich areas to those lacking production resources. Additionally, in the current digital era, MSME actors can easily disseminate economic benefits, thereby fostering the emergence of new businesses and expanding business growth to an international level.

According to Law No. 20 of 2008 concerning Micro, Small, and Medium Enterprises, MSMEs and their criteria are explained and have been updated in Government Regulation No. 7 of 2021 concerning the Facilitation, Protection, and Empowerment of Cooperatives and Micro, Small, and Medium Enterprises. Based on this regulation, micro-enterprises are defined as productive businesses owned by individuals and/or individual-owned entities with a maximum business capital of one billion rupiah. Small enterprises are independent productive economic businesses run by individuals or business entities that are not subsidiaries, directly or indirectly, of medium or large businesses, and meet the criteria for small enterprises as defined by law (Yasin & Studiviany, 2022). Medium enterprises are independent productive economic businesses run by individuals or business entities that are not subsidiaries or branches of small or large businesses, with a certain amount of net assets or annual sales revenue as regulated by law (Halim, 2020).

The growth and role of MSMEs in competitive markets must be accompanied by the ability to develop business strategies. This must be balanced with knowledge and skills, technological advancement, quality improvement, product competitiveness, innovation, and entrepreneurship. Without these capabilities, MSMEs may face potential weaknesses and business risks, both internally and externally. Most weaknesses of MSMEs in Indonesia stem from several factors, including lack of capital and credit access, low managerial and organizational skills, and insufficient marketing strategies. On the other hand, MSMEs are expected to be competitive, resilient in times of crisis, and act as a solution to economic problems in Indonesia. According to Haryo Limanseto (2023) from the Coordinating Ministry for Economic Affairs, MSME activities contribute to 61 percent of the National Gross Domestic Product (GDP), or around IDR 9,580 trillion, and absorb 97 percent of the workforce. Therefore, when Indonesia faced multiple crises, including the Covid-19 pandemic, MSMEs proved to be capable of weathering the economic storm (Meisthya & Dyastari, 2022).

Indonesia is the world's largest archipelagic country, consisting of 17,504 islands with a coastline of 81,000 km and a sea area of approximately 5.7 million km^2, accounting for 62 percent of its territory. The vast coastal and marine areas offer significant natural resources as potential economic development assets that remain underutilized. The fisheries sector is one of the sectors that absorbs a large workforce, starting from capture and aquaculture activities to processing, distribution, and trade. Both directly and indirectly, the fisheries sector plays an essential role for millions of people who rely economically on this sector. The economic role of fisheries contributes to the emergence of MSMEs in the fisheries field.

Data from the Department of Cooperatives, Small and Medium Enterprises, Industry and Trade of Jembrana Regency indicate that from 2019 to 2023, fish production in Jembrana Regency declined. Over five years, the value of fish production reached IDR 838.94 billion. However, from 2020 to 2023, the production value continued to decrease at an average rate of IDR 12.4 billion per year, with the steepest decline occurring in 2023. Between January and August 2023, production volume at Pengambengan Nusantara Fishing Port (PPN) was relatively low due to unfavorable weather conditions, which affected catch results. Conversely, from September to

December 2023, production volume increased in line with improved weather (PPN Pengambengan Annual Report, 2024).

According to BPS Jembrana Regency (2023), aside from fishing and aquaculture, other fishery-related activities in Jembrana include canned fish industries, fishing ports, and home-based fish processing businesses. Fishery activities in the regency are centered in Pengambengan Village, Negara District. The potential of fish catches is indicated by the number of boats landing at PPN Pengambengan, totaling 70 purse seine boats with capacities of 5–30 gross tons (GT) and 100 small boats. This supports the availability of raw materials for both industrial and MSME fish processing (BPS Jembrana, 2023).

Capital is a critical factor in starting and operating a business. Any business startup requires capital to support daily operations, both in terms of quality and quantity (Musvira et al., 2022). A common issue faced by MSMEs is insufficient capital, which hinders business development and innovation, causing operations to stagnate. This lack of capital prevents business actors from increasing their production to gain higher turnover, and new business ideas are often set aside due to this limitation (Sidik & Ilmiah, 2021).

Business capital is a vital element required to initiate, manage, and grow a fish processing business. This includes not only funds for purchasing raw materials but also investment in processing equipment, packaging, marketing, and distribution. Limited capital often obstructs MSMEs from enhancing production capacity and product quality, thereby affecting their market competitiveness.

In the fisheries sector, fish processing activities are still largely traditional and conducted at household industry levels. MSME actors continue to face major challenges, particularly in capital, which significantly hinders growth. Syarif and Budhiningsih (2009) state that capital issues rank first in the effort to enhance small and medium business capacity. The government has allocated various support mechanisms, such as the People's Business Credit (KUR) program launched in 2007. However, many MSME actors have not benefited from it due to lack of access or knowledge about the program.

The low contribution of credit programs stems from multiple issues, including sector-specific program objectives, implementation schemes that do not align with MSME characteristics, and unprepared funding institutions. Furthermore, bank lending services still face challenges in addressing MSME problems. Nugroho et al. (2016) explain that MSMEs' limited access to banking credit services is due to banks' reluctance to issue small-scale loans. The reasons include high costs and risks of non-performing loans, inadequate MSME accounting systems, inability to provide loan collateral, and rigid banking regulations. Therefore, alternative funding solutions are needed to support MSME development through financial institutions in Indonesia.

The second common issue faced by MSMEs is the low level of education. Todaro (2006:150) asserts that education plays a crucial role in absorbing modern technology and developing the capacity necessary for sustainable growth. Based on this perspective, education is a lifelong effort with a positive impact on MSME entrepreneurs' business development. Education is the primary asset for advancing a

business under any condition, as it can change behavior and attitudes, enhance thinking patterns, broaden perspectives, and make it easier for business actors to absorb new information for their business growth, thereby increasing their income.

The higher one's education level, the more likely they are to earn a decent income. This includes the human resources of MSME owners and employees. With qualified human resources, the financial and non-financial performance of MSMEs is expected to improve (Sidik & Ilmiah, 2021). A common phenomenon in Indonesian MSMEs is that business owners have only completed secondary education and lack business or economic training.

Another factor is technology. Many MSME actors face challenges in utilizing technology due to traditional mindsets. Other issues include low financial literacy, such as inability to record income and expenses properly, and inadequate mobile phone quality. Although many MSME actors are interested in using technology like social media and e-commerce platforms to grow their businesses, these desires often go unrealized due to device limitations.

Another opportunity for developing fish-processing MSMEs in Pengambengan Village lies in the availability of raw materials and fish-processing groups supported by the government. Fish landing and capture activities in Jembrana are concentrated at PPN in Pengambengan Village. Therefore, fisheries are a primary source of livelihood in the village. Raw materials, or the basic elements used to create a product, are crucial in business operations (Jalaliah et al., 2022). Despite automation in the current era, labor remains essential to the production process.

Main processed fish commodities from Pengambengan include lemuru, mackerel, sailfish, and shrimp (BPS, 2024). These raw materials are necessary for production, and acquiring them requires financial expenditure. However, annual fish yields fluctuate due to weather, leading to higher fish prices during adverse conditions.

Another factor influencing income is working hours. To achieve optimal results, working hours must be used effectively and systematically. Increased working time can lead to higher income (Ayuningsasi & Sasmitha, 2017). Therefore, to meet production targets and boost income, efficient time management through extended working hours is essential.

Based on the above explanation, this study was conducted because fish-processing MSMEs in Pengambengan Village, Jembrana Regency have significant potential for development and can contribute more to the local economy and community welfare. However, despite this potential, MSME actors still face several challenges, including lack of capital access, low education levels limiting product diversification, reliance on traditional technologies, difficulty obtaining raw materials due to fluctuating fish prices and weather, and ineffective working time management. Thus, comprehensive efforts are needed to improve capital access, adopt advanced processing technologies, and increase the income of fish-processing MSME actors as a priority to support their sustainable growth.

METHOD

This study uses a quantitative approach with an associative method aimed at analyzing the influence of capital, education level, technology, raw materials, and working hours on the income of fish-processing MSMEs in Pengambengan Village, Jembrana Regency. The location was selected based on the high level of fish processing business activities in the area, which serves as the largest production center in Jembrana Regency. The research population consists of all fish-processing MSME actors in Pengambengan Village, totaling 134 business units. The sample was determined using the Slovin formula, resulting in 58 samples selected through probability sampling with the simple random sampling method. Research variables were measured using clearly defined operational definitions, such as income calculated in rupiah per month, business capital as the total funds used, education level based on the number of years of schooling, technology use measured as a dummy variable (used or not used), while raw materials and working hours are stated in rupiah value and total working hours per month (Sugiyono, 2018; Widodo, 2016).

Data collection was carried out through observation, structured interviews, and documentation, with primary data sourced from MSME actors and secondary data obtained from related institutions. The data analysis techniques used were descriptive analysis to describe data characteristics and multiple linear regression analysis to test the influence of capital, education level, technology, raw materials, and working hours on income. The following is the multiple linear regression model used in this study:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + +\beta_3 D + \beta_4 X_4 + \beta_5 X_5 + \mu \quad (1)$$

Explanation:

Y	= Income of MSMEs
X_1	= Capital
X_2	= Education level
X_3	= Raw materials
X_4	= Working hours
D	= E-commerce technology (0 = does not use e-commerce technology, 1 = uses e-commerce technology)
$\beta_1, \beta_2, \beta_3, \beta_4, \beta_5$	= Regression coefficients of each variable
β_0	= Constant/intercept
μ	= Standard error

The next stage is the Classical Assumption Test, which includes:

1) Normality Test

   This test is conducted to determine the normality of residuals in the study. The method used is the Kolmogorov-Smirnov (K-S) test.

2) Heteroscedasticity Test

   To identify the presence of heteroscedasticity symptoms, the Glejser Test is used by regressing the independent variables against the absolute residual variable.

3) Multicollinearity Test

To detect whether there is a correlation among independent variables, it can be seen from the Tolerance and Variance Inflation Factor (VIF) values. With the assumption that the Tolerance value is > 10 percent and the VIF < 10, the regression model does not contain multicollinearity.

The next testing stage is the simultaneous testing of the influence of capital, education level, technology, raw materials, and working hours on income. The F-test is used to determine whether all independent variables together (simultaneously) have an effect on the dependent variable. If the obtained value of F-count > F-table or the significance value ≤ α (0.05), it means that the independent variables simultaneously affect the dependent variable, and vice versa.

The next stage is the partial testing of the influence of capital, education level, technology, raw materials, and working hours on income. The t-test is used to test the significance level of the effect between the independent variables and the dependent variable used in the study, with the criterion that the probability value must be < 0.05.

RESULTS AND DISCUSSION

Descriptive Statistical Analysis Results

Descriptive statistics are used to describe a group of data, such as the mean, highest value, lowest value, and standard deviation of the analyzed sample. The results of the descriptive statistical analysis processed using the EViews 13 application can be seen in Table 1 below.

Table 1. Descriptive Statistical Analysis Results

	Y	X1	X2	X4	X5
Mean	4398276.	7155172.	12.65517	3205172.	309.8276
Median	3900000.	7500000.	12,00000	3000000.	300,0000
Maximum	9000000.	13000000	16,00000	7000000.	360,0000
Minimum	800000.0	2000000.	6,000,000	900000.0	240,0000
Std. Dev.	1994861.	2305993.	2.004834	1558837.	41.06013
Skewness	0.586206	0.126184	-0.137521	0.534182	-0.317333
Kurtosis	2.672222	2.909437	4.107705	2.616364	2.054344
Jarque-Bera	3.581476	0.173738	3.148091	3.114062	3.134578
Probability	0.166837	0.916797	0.207205	0.210761	0.208610
Sum	2.55E+08	4.15E+08	734,0000	1.86E+08	17970.00
Sum Sq. Dev.	2.27E+14	3.03E+14	229.1034	1.39E+14	96098.28
Observations	58	58	58	58	58

Source: Results of ereviews processing, 2025

Based on Table 1, the number of samples in this study is 58 people. Table 1 shows that the income variable (Y) has the lowest or minimum value of IDR 800,000 and the highest (maximum) value of IDR 9,000,000. The average (mean) value of income is IDR 439,827.6 with a standard deviation of IDR 1,994,861. This shows that the average value of income is greater than the standard deviation, meaning that the deviation is smaller than the average value of all data in the income variable which can describe the entire variable in good condition.

The capital variable (X1) has the lowest or minimum value of IDR 2,000,000 and the highest (maximum) value of IDR 13,000,000. The average (mean) value of capital is IDR 7,155,172 with a standard deviation of IDR 2,305,993. This shows that the average value of capital is greater than the standard deviation, meaning that the deviation is smaller than the average value of all data in the capital variable which can describe the entire variable in good condition.

The education level variable (X2) has the lowest or minimum value of 6 and the highest (maximum) value of 16. The average (mean) value of education level is 12.65517 with a standard deviation of 2.004834. This shows that the average value of education level is greater than the standard deviation which means that the deviation is smaller than the average value of all data in the education level variable which can describe the entire variable in good condition.

The raw material variable (X4) has the lowest or minimum value of IDR 900,000 and the highest (maximum) value of IDR 7,000,000. The average (mean) value of raw material is IDR 3,205,172 with a standard deviation of IDR 1,558,837. This shows that the average value of technology is greater than the standard deviation which means that the deviation is smaller than the average value of all data in the raw material variable which can describe the entire variable in good condition.

The working hours variable (X5) has the lowest or minimum value of 240 and the highest (maximum) value of 360. The average (mean) value of working hours is 309.8276 with a standard deviation of 41.06013. This shows that the average value of working hours is greater than the standard deviation which means that the deviation is smaller than the average value of all data in the working hours variable which can describe the entire variable in good condition.

Inferential Analysis (Multiple Linear Regression)

Table 2. Results of Inferential Analysis Test (Multiple Linear Regression)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-4883461.	979412.6	-4.986112	0.0000
X1	0.263725	0.068907	3.827255	0.0003
X2	89725.44	64563.05	1.389734	0.1705

X3	861675.1	265849.8	3.241210	0.0021
X4	0.286655	0.091734	3.124844	0.0029
X5	16134.04	2769,544	5.825524	0.0000

R-squared	0.903059	Mean dependent var	4398276.
Adjusted R-squared	0.893738	SD dependent var	1994861.
SE of regression	650281.8	Akaike info criterion	29.70590
Sum squared residual	2.20E+13	Schwarz criterion	29.91905
Log likelihood	-855.4710	Hannan-Quinn criter.	29.78892
F-statistic	96.88204	Durbin-Watson stat	1.942664
Prob(F-statistic)	0.000000		

Source: Results of ereviews processing.

Based on the results of the test using the multiple regression method in Table 2 to examine the effect of the independent variables, namely Capital (X1), Education Level (X2), Technology (D), Raw Materials (X4), and Working Hours (X5) on the dependent variable, namely income (Y) of fish processing MSME actors in Pengambengan Village, a multiple linear equation is formulated as follows:

$\hat{Y}$ = -4883461 + 0,263725X_1 + 89725,44X_2 + 861675,1D + 0,286655X_4 + 16134,04X_5

t = (-4,986112) (3,827255) (1,389734) (3,241210) (3,1241210) (5,82552)

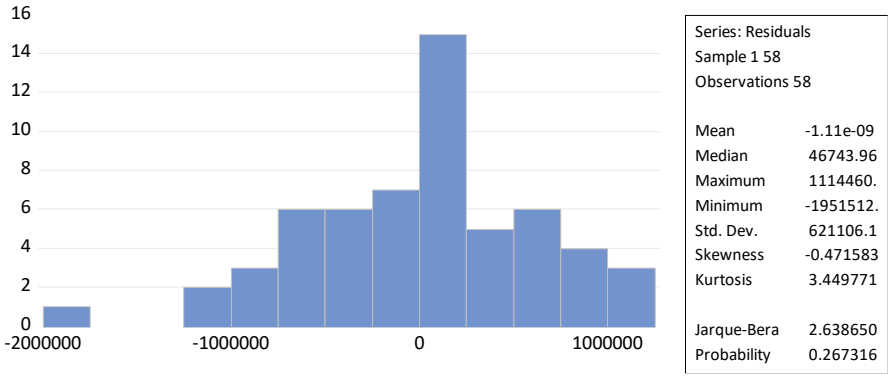
Prob. = (0,0000) (0,0003) (0,1705) (0,0021) (0,0029) (0,0000)

R^2 = 0.893 F_{count}= 96.88204 Prob (F-statistics) = 0.000000

Classical Assumption Test

1) Normality Test

Figure 1. Normality Test Results



Source: Results of ereviews processing, 2025

Based on the results of the normality test using the Kolmogorov-Smirnov Test, the probability value (Prob.) obtained is 0.267316, which is greater than 0.05. This indicates that the residuals are normally distributed. Therefore, it can be

concluded that the regression model satisfies the normality assumption and is suitable for further analysis.

2) Heteroscedasticity Test

Table 3. Heteroscedasticity Test Results

F-statistic	1.485494	Prob. F(5,52)	0.2105
Obs*R-squared	7.249059	Chi-Square Prob.(5)	0.2028
Scaled explained SS	7.198886	Chi-Square Prob.(5)	0.2063

Source: Results of ereviews processing, 2025

Based on Table 3, the results of the heteroscedasticity test show that there is no influence of the independent variables—namely capital, education level, technology, raw materials, and working hours—on the absolute residual, as indicated by the significance values being greater than 0.05. This demonstrates that there is no variance difference in the residuals as the values of the independent variables change within the regression model. Therefore, based on this data, it can be concluded that there is no indication of heteroscedasticity in this regression model.

3) Multicollinearity Test

Table 4.1Multicollinearity Test Results

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
C	9.59E+11	131.5698	NA
X1	0.004748	36.74553	3.403422
X2	4.17E+09	93.82328	2.258377
X3	7.07E+10	3.844123	2.319730
X4	0.008415	14.61373	2.756349
X5	7670373.	102.7339	1.743127

Source: Results of ereviews processing, 2025

Based on the data processing results shown in Table 4, the multicollinearity test conducted to obtain the VIF values for the variables of capital, education level, technology, raw materials, and working hours shows values less than 10.00. Conversely, the tolerance values are greater than 0.10. Based on these criteria, it can

be concluded that there is no indication of multicollinearity in this study, so the model meets the classical assumption requirements in regression analysis.

Coefficient of Determination (R^2) Results

The coefficient of determination (R^2) analysis is an important measure in multiple linear regression analysis used to assess how well the constructed regression model explains the variation in the dependent variable. The R^2 result measures the proportion of the total variation in the dependent variable that can be explained by the simultaneous variation of the independent variables in the model.

Based on Table 2, the coefficient of determination test shows that the R^2 value is 0.893. This result means that the income variation of fish-processing MSME actors in Pengambengan Village can be explained by the variables of capital, education level, technology, raw materials, and working hours by 89.3 percent, while the remaining 10.7 percent is explained by other factors not included in the study.

The Effect of Simultaneous Testing of Capital, Education Level, Technology, Raw Materials, and Working Hours on the Income of Fish Processing MSMEs in Pengambengan Village, Jembrana Regency (F-Test)

In regression analysis, the F-test is used to test variables simultaneously. Essentially, the F-statistical test aims to determine whether all independent variables included in the model have a joint or simultaneous effect on the dependent variable. The statistical test is comprehensively conducted by comparing the calculated F-value (Fcount) with the F-table value at a confidence level of 95 percent or α = 5 percent (0.05).

Based on the results of the F-test shown in Table 2, it is known that the F-statistic value is 96.88204, and the significance level is 0.000, which is less than 0.05. From these results, it can be concluded that there is a statistically positive and significant simultaneous effect of capital, education level, technology, raw materials, and working hours on the income of fish processing MSME actors in Pengambengan Village.

The Effect of Partial Testing of Capital, Education Level, Technology, Raw Materials, and Working Hours on the Income of Fish Processing MSMEs in Pengambengan Village, Jembrana Regency (t-Test)

The t-statistical test aims to show whether each independent variable has an effect on the dependent variable. The t-test is conducted to evaluate the significance of the individual effect of each independent variable on the dependent variable, namely income (Y). The partial test (t-test) in the constructed regression model can be observed through its significance probability. If the significance probability value is less than or equal to the significance level of 0.05 (sig ≤ 0.05), then H0 is rejected and H1 is accepted.

If the significance probability value is greater than the significance level of 0.05 (sig > 0.05), then H0 is accepted and H1 is rejected. The t-test is formulated as follows.

$$t = \frac{b_i - \beta_i}{Sb_i} \quad \text{.....(2)}$$

Description:

t = calculated t-value

b_i = the i-th partial regression coefficient from the sample regression

β_i = the i-th partial regression coefficient from the population regression

Sb_i = standard error of b_i

The partial test in this study is described as follows based on Table 2.

1) **The Effect of Business Capital (X1) on the Income of MSME Fish Processing Entrepreneurs in Pengambengan Village, Jembrana Regency (Y)**

   Based on Table 2, the analysis result of the business capital variable (X1) shows a coefficient of 0.263725 and a probability value of 0.0003, which is less than 0.05. From this result, it is concluded that t-count 3.827 > t-table 1.675 or the significance value 0.0003 < 0.05, thus H0 is rejected and H1 is accepted. Therefore, business capital partially has a positive and significant effect on the income of MSME fish processing entrepreneurs in Pengambengan Village, Jembrana Regency.

2) **The Effect of Education Level (X2) on the Income of MSME Fish Processing Entrepreneurs in Pengambengan Village, Jembrana Regency (Y)**

   Based on Table 2, the analysis result of the education level variable shows a coefficient value of 89,725.44. The calculation results show that t-count 1.389 < t-table 1.675 or the probability value 0.170 > 0.05, thus H0 is accepted and H1 is rejected. It can be concluded that education level partially has no effect on the income of MSME fish processing entrepreneurs in Pengambengan Village, Jembrana Regency.

3) **The Effect of Technology (D) on the Income of MSME Fish Processing Entrepreneurs in Pengambengan Village, Jembrana Regency (Y)**

   Based on the test result of the technology variable in Table 2, the coefficient value obtained is 861,675.1. The results show that t-count 3.241 > t-table 1.675 or the probability value 0.002 < 0.05, thus H0 is rejected and H1 is accepted. Therefore, it is concluded that the technology variable has a positive and significant effect on the income of MSME fish processing entrepreneurs.

4) **The Effect of Raw Materials (X4) on the Income of MSME Fish Processing Entrepreneurs in Pengambengan Village, Jembrana Regency (Y)**

   In the test result of the raw materials variable found in Table 2, the coefficient value is 0.286655. The results show that t-count 3.124 > t-table 1.675 or the probability value 0.002 < 0.05, thus H0 is rejected and H1 is accepted. This means

that raw materials partially have a positive and significant effect on the income of MSME fish processing entrepreneurs in Pengambengan Village, Jembrana Regency.

5) **The Effect of Working Hours (X5) on the Income of MSME Fish Processing Entrepreneurs in Pengambengan Village, Jembrana Regency (Y)**

Based on the analysis result in Table 2, the test on the working hours variable shows a coefficient value of 16,134.04. It can be concluded that t-count 5.825 > t-table 1.675 or the probability value 0.000 < 0.05, thus H0 is rejected and H1 is accepted. Therefore, it is concluded that working hours have a positive and significant effect on the income of MSME fish processing entrepreneurs in Pengambengan Village, Jembrana Regency.

Discussion of Research Results

The Effect of Business Capital on the Income of Fish Processing MSMEs in Pengambengan Village, Jembrana Regency

Based on the test results for the business capital variable, it was found that capital is one of the important factors that can influence the income of fish processing MSME actors in Pengambengan Village. Business capital is one of the determining factors in starting a business. Based on an in-depth interview conducted with Mrs. Sri Hukmia, who was met at her residence in Br. Munduk on March 20, 2025, she stated that business capital has a positive and significant influence on the income of fish processing MSME actors. The results of the in-depth interview reflect that the main problems that often occur regarding capital are related to capital accessibility, especially for micro and small-scale MSMEs that may experience difficulties in meeting the strict requirements of formal financial institutions. In addition, capital adequacy problems also pose an obstacle. The available capital may not be sufficient to finance business expansion, procurement of more advanced technology, or to cope with raw material price fluctuations. Without sufficient and easily accessible capital, the potential income increase indicated by the significance of the capital variable cannot be optimally realized, thus hindering the growth and competitiveness of MSMEs in the long term.

If the capital used by MSME actors to start their business is large enough, it can increase their production results, which in turn affects income because the main function of capital is to finance all the needs required in the production process to increase output. Based on the statements given by MSME actors, the lack of government attention regarding counseling or efforts to provide information about financing is also one of the factors causing the fisheries MSME sector to not be able to operate optimally.

Nadhiro et al. (2025) stated that business capital has a positive and significant effect on the income of MSME actors. In addition, similar research was also conducted by Silvana & Syamsul (2024), who stated that business capital has a positive and significant effect on the income of MSMEs in Taman Vatungguni. This research is also in

line with the study by Ayuni (2024), who stated that business capital has a positive and significant influence on the income of MSMEs in Deli Tua District. Maulania et al. (2020) stated that business capital partially has a positive and significant effect on the income of sugarcane ice MSMEs in Mojokerto City. Capital is an important factor needed in establishing a business. Without capital, people cannot start or develop a business. The capital factor plays an important role in trade businesses, which leads to other problems, for example, when the available capital is limited, a person can only start their trade business without being able to maximize its potential.

The Effect of Education Level on the Income of Fish Processing MSMEs in Pengambengan Village, Jembrana Regency

The test results indicate that the education level variable does not have a partial effect on the income of fish processing MSME actors in Pengambengan Village. An interview with Mrs. Rita Andriyani, who was met at her home in Br. Kelapa Balian on April 10, 2025, confirmed that although education has a positive effect, it is not significant in determining income. This in-depth interview revealed that although education contributes to improving the intellectual capacity of business actors, in the context of fish processing MSMEs, education is not the main determinant of income. Most MSME actors tend to develop informal skills rather than continuing formal education.

This indicates that in fish processing MSMEs in Pengambengan Village, a higher level of formal education does not directly serve as the main factor in income improvement. This can be understood through the intrinsic characteristics of fish processing businesses, which rely heavily on practical skills and field experience. Skills in fish processing techniques, selecting quality raw materials, daily production management, and building strong market networks are mostly obtained through hands-on experience or informal learning.

This research aligns with Todaro (2000), who stated that education has long-term effects on economic and social development, but does not always provide a direct impact on income growth in micro businesses, especially when practical skills and work experience are more critical than formal education. These results also support findings by Sukma et al. (2022) and Hasanah et al. (2020), who both concluded that the level of education does not have a positive and significant effect on MSME income.

The Effect of Technology on the Income of Fish Processing MSMEs in Pengambengan Village, Jembrana Regency

The test of the technology variable shows that technology has a partial effect on the income of fish processing MSME actors in Pengambengan Village. This result is reinforced by an interview with Mrs. Eva Artianingsih, owner of a shredded fish MSME, who was met at her home in Br. Kelapa Balian on April 10, 2025, and confirmed that technology affects MSME income. In fish processing MSMEs, the use of marketing technology (such as social media or e-commerce) can expand market reach, increase

promotional efficiency, and facilitate better communication with customers—ultimately driving income growth. According to Romer (1990), technological advancement is the main driver of productivity and income growth in modern economies. Technology increases production efficiency, broadens market access, and accelerates transactions and consumer communication.

This research supports the findings of Irama et al. (2022), who stated that marketing technology positively and significantly affects MSME income in Medan. Similarly, Astuti et al. (2023) found that marketing technology positively and significantly affects the income of MSME actors.

The Effect of Raw Materials on the Income of Fish Processing MSMEs in Pengambengan Village, Jembrana Regency

The test results for the raw material variable show that raw materials have a partially positive and significant effect on the income of fish processing MSME actors. Raw materials are one of the production factors that influence income. The more raw materials used, the higher the resulting production output. In this study, most raw materials used by MSME actors were obtained from their own fish catches from the sea around Jembrana Regency.

This is supported by an interview with Mrs. Wiwik Rosita, a salted fish MSME owner, who was interviewed on April 20, 2025, in Br. Kelapa Balian. She confirmed that the cost of raw materials influences production output and income. The interview highlighted major challenges such as fluctuating raw material prices—especially fresh fish—which are heavily affected by weather conditions, fishing seasons, and market dynamics. Unstable prices make it difficult for MSMEs to plan production costs and set selling prices, potentially reducing profits. Another problem is the availability of raw material supply, especially during off-seasons or when sea conditions hinder fishing activities. Limited supply can disrupt production capacity and the ability to meet market demand, ultimately restricting potential income increases.

According to Sukirno (2006), raw materials are a critical component in determining production output. These findings are consistent with research by Suarmanayasa (2024), which found that raw materials have a positive and significant effect on the income of songket weavers in Singaraja. Laia et al. (2025) also found that raw materials positively and significantly affect the income of tempe-producing MSMEs in Medan. The use of high-quality and sufficient raw materials helps MSMEs meet market demand optimally.

The Effect of Working Hours on the Income of Fish Processing MSMEs in Pengambengan Village, Jembrana Regency

The test results for the working hours variable show that working hours have a partially positive and significant effect on the income of fish processing MSME actors in Pengambengan Village. This result is supported by an interview with Mrs. Nur Liana, an

MSME owner who was met at her home in Br. Munduk on April 13, 2025. She confirmed that the number of working hours positively and significantly affects income. These findings reflect the direct understanding of fish processing MSME actors that the longer the working hours, the greater the potential income. According to the theory of David Ricardo, labor plays an important role in the production process and income generation. Efficient labor allocation increases productivity and output in small and medium enterprises, including in the marine processing sector.

This research is supported by findings from Anjani & Ayuningsasi (2023), who found that working hours have a positive and significant effect on the income of MSMEs in the trade sector in Badung Regency. A similar study by Muzaki et al. (2025) found that longer working hours have a positive and significant influence on increasing the income of lanting product MSMEs.

CONCLUSION

Based on the discussion and the explanation provided earlier, the following conclusions can be drawn:

1) Business capital, education level, technology, raw materials, and working hours simultaneously have a significant effect on the income of fish processing MSME actors in Pengambengan Village.
2) Business capital, technology, raw materials, and working hours partially have a positive and significant effect on the income of fish processing MSME actors in Pengambengan Village. Meanwhile, the education level variable has a positive but not significant partial effect on the income of fish processing MSME actors.

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