

Analysis of the Impact of Digital Technology on Fishermen's Income in Sumare Village, Mamuju Regency

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ABSTRACT

This study aims to analyze the impact of digital technology on fishermen's income in Sumare Village, Mamuju Regency. The study employed a quantitative approach using a survey method with 30 respondents selected through purposive sampling. The research instrument consists of a questionnaire using a 1-5 Likert scale. Data analysis includes validity testing, reliability testing, descriptive statistics, and simple linear regression using SPSS. The validity test results indicate that all statement items are valid (calculated $r > 0.30$). The results of the simple linear regression analysis yielded the equation $Y = 5.847 + 0.536X$ with a coefficient of determination (R^2) of 0.368, meaning that digital technology contributes 36.8% to the increase in fishermen's income. The t-test showed a calculated t-value (4.036) > table t-value (2.048) with a significance level of $0.000 < 0.05$, thus accepting the hypothesis that there is a positive and significant effect of digital technology use on fishermen's income in Sumare Village, Mamuju Regency.

INTRODUCTION

Rapid advancements in information and communication technology have brought about fundamental changes across various economic sectors, including the fisheries sector. The use of digital technology enables increased efficiency, productivity, and expanded market access for fisheries businesses (Apdillah, 2022). Digital transformation has become a vital tool for accelerating inclusive and sustainable growth in the fisheries sector amid rising global demand for seafood products (FAO, 2021).

Sumare Village is a coastal area where the majority of residents work as fishermen. The economic conditions of the coastal community in Sumare Village are relatively unstable because fishermen's incomes are highly dependent on natural factors and limited market access (Nurbaya, 2019). Most fishermen still rely on traditional marketing systems through middlemen or brokers, resulting in weak bargaining power and incomes that tend to be low and unstable (Fauzan, 2025). According to BPS data (2023), more than 65% of small-scale fishermen in Indonesia have not yet utilized digital technology. KKP data (2023) also notes that more than 70% of fisheries actors are not yet connected to digital marketing platforms. This situation indicates a significant gap in technology adoption among fishermen, particularly in coastal areas such as Sumare Village. Several previous studies have examined digital technology adoption in the fisheries sector. Wulan et al. (2024) found that digital literacy and social networks play a crucial role in the success of fishermen's digital marketing; however, that study was conducted in urban areas with relatively adequate digital infrastructure. Meanwhile, Kraus et al. (2022) highlighted the potential of platforms such as WhatsApp, Facebook, TikTok, and Shopee in expanding the market for fishery products and reducing dependence on intermediaries, but did not specifically analyze their impact on fishermen's income in remote coastal areas. Apdillah (2022), on the other hand, emphasizes the benefits of digitalization for the efficiency of fisheries businesses; however, his study has not addressed the context of small-scale fishermen in West Sulawesi, who possess distinct socio-economic characteristics and face different infrastructure limitations.

The novelty lies in the combination of two aspects that have not been examined together in the existing literature, namely: (1) the contextual mapping of digital technology adoption in coastal fishing communities in West Sulawesi, where traditional marketing systems based on middlemen remain dominant; and (2) the measurement of the direct impact of digital technology use on increasing the income of small-scale fishermen in areas with limited digital infrastructure. This approach offers a relevant new perspective for the development of fisheries digitalization policies in the eastern coastal regions of Indonesia. This study aims to: (1) analyze the application of digital technology in fishermen's activities in Sumare Village; and (2) analyze the impact of digital technology use on increasing fishermen's income in Sumare Village, Mamuju Regency. The research results are expected to provide scientific contributions and policy recommendations for the development of a digital technology-based fisheries sector in the coastal areas of West Sulawesi.

LITERATURE REVIEW

Digital Technology in Fisheries

Digital technology encompasses various internet-based platforms and applications that enable businesses to communicate, market, and conduct transactions online. In the context of fisheries, digital technology includes the use of social media (WhatsApp, Facebook, TikTok) and marketplaces (Shopee, Tokopedia) as marketing channels for fish catches (Danuri, 2019). The use of digital technology has been shown to expand market reach, shorten distribution chains, and enhance the competitiveness of small-scale fishery products (Alpiani et al., 2025). The relationship between the adoption of digital technology and increased fishermen's income can be explained through several interrelated mechanisms. First, digital technology enables fishermen to access real-time market price information, allowing them to set more competitive selling prices and no longer rely entirely on unilateral price setting by middlemen (Kurniawan et al., 2023). Second, the use of digital marketing platforms directly shortens the distribution chain by connecting fishermen directly to end consumers, which ultimately increases the profit margins received by fishermen (Wulan et al., 2024). Third, a broader market reach through social media and marketplaces opens up greater and more diverse transaction opportunities, thereby reducing fishermen's reliance on a single marketing channel vulnerable to price fluctuations (Kraus et al., 2022).

A synthesis of various studies indicates that the relationship between digital technology and fishermen's income is not direct or automatic but is mediated by several key factors. Wulan et al. (2024) emphasize that digital literacy is a primary prerequisite for fishermen to effectively utilize digital platforms. Meanwhile, Alpiani et al. (2025) add that innovations in marketing strategies such as creating engaging product content on TikTok or managing store reputation on Shopee also determine the extent to which digital technology contributes to increased sales volume. Furthermore, Apdillah (2022) emphasizes that the availability of adequate internet network infrastructure in coastal areas is a critical factor that cannot be overlooked. Thus, the adoption of digital technology will have an optimal impact on fishermen's income if simultaneously supported by sufficient digital literacy, adaptive marketing strategies, and adequate connectivity infrastructure.

Fishermen's Income

Fishermen's income is the total amount of money received from fishing activities and side businesses over a specific period. The level of fishermen's income is influenced by various factors, including business capital, seafaring experience, technology used, fish selling prices, and market access (Nirmawati, 2018). Increasing income is a top priority in efforts to improve fishermen's welfare (Kamaruddin, 2025).

FRAMEWORK

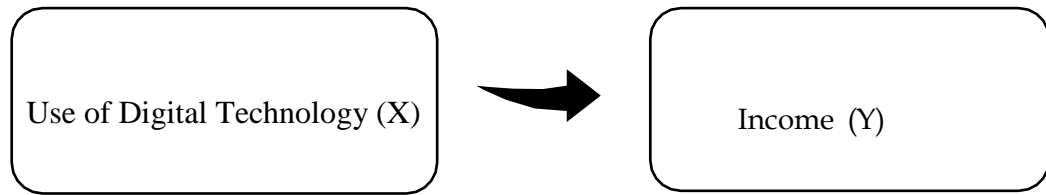


Figure 1. Research Framework

The utilization of digital technology (Variable X), which includes the use of social media platforms and online marketplaces in the marketing of fish catches, directly influences fishermen's income (Variable Y). The higher the level of digital technology utilization, the higher the income fishermen are expected to earn through expanded market access and reduced marketing costs.

METHODOLOGY

This study employs a quantitative approach using a survey method. The research location is the coastal area of Sumare Village, Simboro Subdistrict, Mamuju Regency (Figure 2). The study was conducted from February to March 2026. The study population consists of all active fishermen in Sumare Village, totaling 93 individuals (42 *punggawa* fishermen and 51 *sawi* fishermen). The sample comprises 30 respondents selected via *purposive sampling*. Data were collected through observation, in-depth interviews, and a structured questionnaire using a 1-5 Likert scale (1 = Strongly Disagree, 5 = Strongly Agree). The questionnaire consisted of two main variables: (1) the Digital Technology Variable (X), comprising 5 items regarding the use of digital platforms in fish marketing; and (2) the Fishermen's Income Variable (Y), comprising 5 items regarding the impact of digital technology on income.

Data analysis included: (1) Validity testing using Pearson's correlation with a calculated $r \geq 0.30$; (2) Reliability testing using Cronbach's Alpha with a standard ≥ 0.60 ; (3) Descriptive statistics; and (4) Simple Linear Regression with the model $Y = a + bX$ to test the effect of digital technology on fishermen's income, followed by a t-test (partial) and the coefficient of determination (R^2)



Figure 2. Research Location

RESEARCH RESULT

Respondent Characteristics

This study involved 30 active fishermen in Sumare Village as respondents. The following is the distribution of respondent characteristics:

Table 1. Characteristics of Fishermen Respondents in Sumare Village

N	Characteristic	Category	Frequency	Percentage (%)
1	Age	< 30 Years	9	30.0%
		30–40 years	9	30.0%
		> 40 years	12	40.0%
2	Highest Level of Education	Did Not Finish	3	10.0%
		School		
		Elementary School	15	50.0%
		Junior High School	9	30.0%
		High School/Vocational High School	3	10.0%
Total			30	100%

According to Table 1, the majority of respondents were over 40 years old (40.0%), followed by those aged 30–40 (30.0%) and under 30 (30.0%). This indicates that the fishing profession is still dominated by adults of working age who have experience in fishing activities (BPS, 2023; FAO, 2022). In terms of

educational attainment, the majority of respondents had low levels of education, namely elementary and junior high school, which aligns with the general characteristics of fishermen in Indonesia (KKP, 2021). This relatively low level of education has the potential to become a barrier to the adoption of digital technology due to limitations in digital literacy and access to information (World Bank, 2021; Organisation for Economic Co-operation and Development, 2020). Other studies also confirm that low educational levels limit fishermen’s ability to access information, adopt innovations, and utilize digital technology in fishing activities (Harun et al., 2025). This aligns with the World Bank’s (2021) findings, which state that literacy and educational levels are key factors in determining the success of technology adoption in community-based economic sectors, including fisheries. Therefore, the relatively low educational levels among fishermen represent one of the challenges in efforts to enhance capacity and modernize the fisheries sector.

Validity Test

Table 2. Validity Test Results

Variable	Item	Calculated r	Table r (0.30)	Description
Digital Technology (X)	X1	0.8537	0.30	Valid
	X2	0.8994	0.30	Valid
	X3	0.9601	0.30	Valid
	X4	0.9642	0.30	Valid
	X5	0.9746	0.30	Valid
Fishermen's Income (Y)	Y1	0.9850	0.30	Valid
	Y2	0.8048	0.30	Valid
	Y3	0.9608	0.30	Valid
	Y4	0.9850	0.30	Valid
	Y5	0.8585	0.30	Valid

Based on Table 2, all items in the Digital Technology (X) and Fishermen’s Income (Y) variables have calculated r values that far exceed the minimum threshold of 0.30, ranging from 0.8048 to 0.9850. These results not only meet the minimum validity criteria but also indicate a very high level of internal consistency among items within each variable. These high item-total correlation values suggest that each statement item truly measures the same construct and reinforces one another, thereby ensuring the instrument possesses excellent measurement quality. For the Digital Technology (X) variable, there is a pattern of increasing calculated r values from item X1 (0.8537) to X5 (0.9746). This pattern indicates that items designed to measure aspects of active digital platform utilization—such as the frequency of using social media and marketplaces for marketing—have stronger discriminatory power compared to items that measure aspects of device ownership or access alone. This finding aligns with Wulan et al. (2024), who assert that the intensity of digital technology use, rather than mere ownership, is a more relevant predictor in measuring fishermen’s

digital capacity. Furthermore, Alpiani et al. (2025) also found that instruments focusing on active usage behavior tend to yield higher validity compared to instruments that only measure the availability of technology access.

For the Fishermen’s Income (Y) variable, items Y1 and Y4 obtained the highest calculated *r* values of 0.9850, while item Y2 obtained the lowest value of 0.8048 – though still well above the validity threshold. This difference in values can be interpreted substantively: items with higher correlations likely measure dimensions of income that are more directly felt and reported by fishermen, such as changes in gross income from sales, while item Y2, which has a relatively lower correlation, may measure dimensions that are more perceptual or long-term – for example, income sustainability or economic satisfaction. This aligns with Nurbaya’s (2019) findings, which identified that coastal fishermen tend to articulate short-term income changes more easily than accumulating holistic perceptions of well-being, given the seasonal instability of their income.

Overall, the high validity scores for both variables also reflect the instrument’s alignment with the local context of respondents in Sumare Village. Kurniawan (2024) notes that research instruments applied to fishing communities with limited formal education must be formulated using concrete and contextual language to ensure proper understanding. The fact that all items yielded correlations above 0.80 indicates that the instrument in this study successfully met this principle: the statements used were consistently understood by respondents and measured their real-life experiences in using digital technology and perceiving its impact on income.

Reliability Test

Table 3. Reliability Test Results

Variable	Cronbach’s Alpha Description	Standard
Digital Technology (X)	0.9575 Reliable	> 0.60
Fishermen’s Income (Y)	0.9473 Reliable	> 0.60

The reliability test results in Table 3 show that the Digital Technology variable (X) has a Cronbach’s Alpha value of 0.9575 and the Fishermen’s Income variable (Y) has a value of 0.9473. Both values not only exceed the minimum standard of 0.60 set by Sugiyono (2019), but also exceed the threshold of 0.90, which Hair et al. (2019) categorize as *excellent reliability*. This means that if the same instrument is administered to the same respondents at different times, the measurement results will be highly consistent and not influenced by chance factors or random response variations.

A Cronbach’s Alpha value of 0.9575 for the Digital Technology variable (X) indicates that the five statement items (X1–X5) collectively measure a cohesive

construct without internal conflict. This very high internal consistency suggests that the respondent fishermen understand and respond to each question regarding digital technology use in a consistent manner – a condition that is not always easy to achieve in a population with diverse formal educational backgrounds. This aligns with Kurniawan’s (2024) observation that technology usage behavior-based instruments for fishing communities must be designed operationally and contextually to yield adequate reliability. The fact that the obtained value falls into the “highly reliable” category reinforces the conclusion that the instrument has successfully represented the respondents’ real-world experiences.

Similarly, the value of 0.9473 for the Fishermen’s Income (Y) variable indicates that the items measuring the income dimension – whether in terms of sales volume, selling price, or market reach form a solid, unified construct. Although the alpha value for variable Y is slightly lower than that of variable X, this difference of 0.0102 is not practically significant, and both remain in the same category. This finding aligns with the study by Kim et al. (2024) in the journal *Sustainability*, which reported Cronbach’s Alpha values above 0.90 for measurement instruments of digital technology adoption in the fisheries sector, and concluded that such high internal consistency is a critical prerequisite before conducting regression analysis to ensure that the measured variance truly reflects the theoretical construct, rather than *measurement error*. Furthermore, Wulan et al. (2024) also emphasize that high instrument reliability in survey-based research in coastal communities is a crucial factor given the respondents’ limited ability to undergo a re-test, making internal consistency the only reliable indicator of reliability.

Simple Linear Regression Analysis

Table 4. Results of Simple Linear Regression Analysis

Model	Coefficient (B)	Std. Error	Calculated t	Sig.
Constant (a)	5.847	1.526	3.830	0.001
Digital Technology (X)	0.536	0.133	4.036	0.000

Based on Table 4, the simple linear regression equation obtained is:

$$Y = 5.847 + 0.536X$$

This equation indicates that the constant (a) of 5.847 means that fishermen’s income is not entirely zero even if digital technology is not utilized at all. This value reflects the contribution of factors beyond digital technology that inherently influence fishermen’s income, such as seafaring experience, traditionally established networks of regular customers, and access to natural resources. This aligns with Nurbaya (2019), who identified that coastal fishermen

possess community-based survival mechanisms that maintain a minimum income level even without the adoption of modern technology. A regression coefficient (b) of 0.536 implies that a one-unit increase in the digital technology utilization score will increase fishermen's income by 0.536 units, assuming all other factors remain constant. This value practically indicates that digital technology makes a tangible but not dominant contribution to changes in income—each increase in the intensity of technology use can only drive an increase of about half a unit in income. This finding is consistent with Wulan et al. (2024), who found that the impact of digital technology on fishermen's income is gradual and mediated by usage capability; thus, the moderate coefficient actually reflects the reality of technology adoption in coastal communities that are still in the transition phase from traditional to digital marketing systems.

Coefficient of Determination (R^2)

Table 5. Coefficient of Determination

R	R Square (R^2)	Adjusted R^2	Standard Error of Estimate
0.607	0.368	0.344	3.98

The results of the analysis in Table 5 show an R value of 0.607, indicating a positive and fairly strong relationship between digital technology and fishermen's income. Referring to Sugiyono's (2019) guidelines for interpreting correlation coefficients, an R value of 0.607 falls into the strong category (0.60–0.799), meaning that changes in the digital technology variable are consistently followed by corresponding changes in fishermen's income to a significant extent. An R^2 value of 0.368 indicates that the use of digital technology explains 36.8% of the variation in changes in fishermen's income. Although this figure is considered moderate, it is important not to interpret it as a one-sided weakness of the model. In survey-based socio-economic research on fishing communities, an R^2 value in the 30–40% range is actually considered realistic and meaningful, given that fishermen's income is a multidimensional construct influenced by many uncontrollable external factors, such as weather conditions, fish price fluctuations, fuel availability, and fishing seasons. Kim et al. (2024), in a similar study on fishing communities in Southeast Asia, reported R^2 values ranging from 0.31 to 0.42 for models examining the adoption of digital technology on income, and concluded that values within that range are sufficiently robust to support causal conclusions in the context of field-based research.

An Adjusted R^2 value of 0.344 slightly lower than R^2 confirms that the model does not suffer from overfitting and that the coefficient of determination obtained remains stable when applied to a larger sample. The small difference between R^2 and Adjusted R^2 (0.368 vs. 0.344) also indicates that the X variables used genuinely provide substantial predictive contributions, rather than merely

artificially inflating the R^2 value. Meanwhile, the 63.2% of unexplained variance opens up opportunities for developing a more comprehensive model in the future, for example by including digital literacy as a mediating variable or internet network infrastructure as a moderating variable, as suggested by Apdillah (2022) and Kraus et al. (2022)

Hypothesis Testing (t-Test)

Based on the regression analysis results in Table 5, a calculated t-value of 4.036 was obtained with a significance level of 0.000. The critical t-value at degrees of freedom (df) = 28 and a significance level of $\alpha = 0.05$ is 2.048. Since the calculated t-value (4.036) > the critical t-value (2.048) and the significance level (0.000) < 0.05, H_0 is rejected and H_1 is accepted. Thus, there is a positive and significant effect of digital technology use on fishermen's income in Sumare Village, Mamuju Regency.

DISCUSSION

The results of this study confirm that the use of digital technology has a positive and significant effect on fishermen's income in Sumare Village. This finding aligns with Rendra's (2019) research, which showed that technology has a positive and significant effect on fishermen's income. These results are also consistent with the findings of Isman et al. (2024), who demonstrated that digital marketing training successfully enhances knowledge and skills in marketing fishery products via social media. Digital technology's 36.8% contribution to fishermen's income indicates that while digital platforms such as WhatsApp, Facebook, TikTok, and Shopee have begun to be utilized, their impact on income growth remains suboptimal. This is likely due to fishermen's limited digital literacy (50% have only elementary school education) and uneven internet infrastructure in coastal areas (BPS, 2023). The average digital technology utilization score (15.53 out of 25), which falls into the moderate category, indicates that while some fishermen are familiar with digital platforms, they have not yet utilized them intensively in their marketing activities. This aligns with findings from the Ministry of Marine Affairs and Fisheries (KKP, 2023) that over 70% of fisheries stakeholders are not yet fully connected to digital marketing platforms. A positive constant value (5.847) indicates that even without digital technology, fishermen in Sumare Village still have a base income from traditional marketing channels. However, a regression coefficient of 0.536 indicates significant potential for income growth if digital technology adoption can be consistently increased, for example through digital marketing training and community-based empowerment programs for fishermen.

CONCLUSION

Based on the research findings and data analysis, the following conclusions can be drawn:

1. The application of digital technology in fishermen's activities in Sumare Village, Mamuju Regency, remains at a moderate level (average score of 15.53

out of 25). The most widely used platforms are WhatsApp and Facebook, while the use of TikTok and Shopee remains very limited.

2. There is a positive and significant effect of digital technology use on fishermen's income in Sumare Village, Mamuju Regency, with the regression equation $Y = 5.847 + 0.536X$. The coefficient of determination $R^2 = 0.368$ indicates that digital technology contributes 36.8% to the increase in fishermen's income. The t-test yields a calculated t-value (4.036) > table t-value (2.048) with a significance level of $0.000 < 0.05$.

RECOMMENDATIONS

Based on the research results, the following recommendations are proposed:

1. Local governments and relevant agencies need to conduct ongoing digital literacy training for fishermen in Sumare Village, focusing on the use of marketplaces (Shopee, Tokopedia) and marketing content on TikTok to expand market reach.
2. Internet network infrastructure in the coastal area of Sumare Village needs to be expanded so that fishermen can utilize digital platforms more optimally.

Future research is recommended to include other variables such as business capital, work experience, and infrastructure as factors that influence fishermen's income, as well as to increase the sample size to enhance the generalizability of the results.

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