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RESEARCH PAPER

Exploring the Role of Rural Women's Micro and Small Enterprises in Coastal Areas in Promoting Sustainable Rural Development: Evidence from Indonesia

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Abstract

Coastal areas in Indonesia are rich in fisheries and marine natural resources and are an alternative source of income for rural women. Rural women's income and education are critical determinants of sustainable rural development. This study aims to explore the income from rural women's micro-small businesses in coastal areas, analyze the influence of rural women's education on increasing micro-small business income, and design a model for women's empowerment. This study uses primary data, which differs from previous empirical studies. The research method was a survey of 132 female owners of micro and small businesses in the coastal region of South Sulawesi, Indonesia, whose raw materials are from fisheries and marine processing products. Data were collected through in-depth interviews and questionnaire instruments. Primary data were analyzed using descriptive statistical analysis, multiple regression methods, and qualitative approaches. This study found that the average income of rural women running micro and small businesses in coastal areas was relatively high. This finding is strengthened by the statistically significant influence of education on rural women's income. The income earned through women's entrepreneurship in micro and small businesses must be balanced with education. This explains that education is crucial for women engaged in micro and small businesses. The model for women's empowerment through synergy-based education, training, and multi-stakeholder collaboration is the ideal approach to achieve sustainable development in rural areas and accelerate technological innovation and knowledge creation.

Keywords: human capital, micro small business, neoclassical growth theory model, rural women, sustainability.
JEL Classification: E13, J16, J24, M21, Q56.

Introduction

Rural areas have abundant natural resources such as agriculture, livestock, forestry and fisheries. These natural resources are essential for rural residents to achieve high prosperity. To balance the economic benefits generated by the population and

environmental sustainability, optimal management and utilisation of natural resources are the primary keys to sustainable rural development. Women are rural assets who have great potential to manage natural resources maximally (Alkire et al., 2013) and (Seymour, 2017), improving the economic value of natural resources, which in turn creates employment opportunities and overcomes the poverty problem in rural areas (Baffoe et al., 2021; Jaysawal and Saha, 2023). Women's involvement in natural resource management in rural areas was initially limited to the agricultural sector. Women are involved in all stages of production in the farming sector (Gandahi, 2016) and contribute to household food security (Onyalo, 2019).

Along with the acceleration of development in various fields, the role of women in development is becoming stronger and broader. This shows that women's sources of livelihood depend not only on the agricultural sector but also on the industrial and services sectors (Ness, 2012). A growing interest among women in processing agricultural products into industrial products is increasing, as indicated by the significant participation of women as micro, small and medium business operators engaged in processing agricultural products. Micro-small businesses for rural women are essential for maintaining life and escaping poverty (Putriantini and Takahashi, 2020). The fisheries and marine sub-sector are among the rural sub-sectors most in demand by micro and small business actors, especially coastal women (Barrios, 2021). The involvement of women in driving micro-small-scale businesses to obtain raw materials from the fisheries and marine sectors plays a vital role in rural development (Nikulina, 2023). The abundant natural resources in coastal areas, such as fisheries, marine products, and other agricultural products, are an alternative source of income for women in coastal areas (Mashapure et al., 2022).

Education is crucial to strengthening rural women's development role (Mashapure et al., 2023) and is the primary strategy for implementing women's empowerment programs (Jaysawal and Saha, 2023). The education of women micro and small business owners is critical in determining the success of their businesses (Alsulami, 2018; Zavaleta Cheek and Corbett, 2024). The higher the education level, the more qualified they are in making decisions to run their businesses. In the era of digital-based technological developments, rural women's micro-small businesses face increasingly complex challenges in increasing their businesses' competitiveness due to their limited knowledge (Alagarsamy, 2014). Women's micro and small businesses are the principal capital in accelerating sustainable rural development. However, women's education in rural areas still

needs to improve (Sinclair et al., 2019). Low levels of education cause low competitiveness of women entrepreneurs, limited market access, and simple application of technology (Nursini, 2020). Related to this, it is essential to improve women's education because it can provide benefits for the businesses they are involved in, which has implications for increasing income and positively impacting the wider development sector (Ayeni et al., 2023). Increasing women's education benefits the businesses they are involved in, which has implications for increasing income and positively stimulates the development of broader sectors. The increasing productivity of women's micro and small businesses in sub-fishery and marine product processing sectors can increase family income and employment, encouraging sustainable rural development (Randell and McCloskey, 2014; Baffoe et al., 2021).

This study contributes to the development economics literature, primarily related to the role of women's entrepreneurship education in increasing business competitiveness and provides information to stakeholders to strengthen the role of education for rural women to increase further the added value of micro and small businesses in coastal areas which can contribute to successful sustainable rural development. This study differs from previous empirical studies, which generally used secondary data. To observe the natural characteristics of rural women in running micro and small businesses, this study uses primary data obtained directly from women's micro and small businesses in the coastal region of South Sulawesi in Indonesia. One of the unique advantages of primary data lies in its ability to reveal actual information about the real issues and challenges women encounter in micro and small businesses. This information is instrumental for developing empowerment models that are responsive to their actual needs.

This study explores the productive economic activities of women engaged in micro and small enterprises in coastal areas. It also seeks to use a quantitative analysis model to analyse the role of education in increasing the competitiveness of micro and small businesses operated by rural women. Furthermore, the results of this research contribute to formulating a model for empowering women in coastal villages to encourage sustainable rural development. This model incorporates various forms of innovation, including educating women micro and small entrepreneurs on the importance of balancing economic values, as well as utilising fisheries and marine resources for sustainable development. In addition, the model involves training rural women entrepreneurs in creating quality product packaging based on market needs, guiding micro and small entrepreneurs in

preparing clear and transparent financial reports, and educating them on utilising the internet to expand product marketing.

Literature Review

Empirical Study of the Role of Rural Women in Productive Economic Activities

Rural women represent valuable human resources with the capacity to catalyze economic, social, and environmental transformation for sustainable development. The productive economic activities of women in rural areas play a pivotal role in driving the local economy (Sinclair et al., 2019). Increasing income through the effective management of natural resources, particularly in agricultural sectors, can generate employment opportunities and overcome the problem of poverty in rural areas, thus fostering sustainable rural development.

The role of women in rural areas has evolved in tandem with developmental progress. Initially recognized predominantly in the agricultural sector, the role of women in rural areas has evolved, and women have witnessed expanded employment opportunities due to both development progress and increased educational levels (Seymour, 2017). Women have worked in non-agricultural sectors, including industry, environment, and other development sectors (Elborgh-Woytek et al., 2013). Currently, the home industry sector is dominated by female workers, enabling women to engage in productive economic activities without compromising their responsibilities in family affairs (Desmawan, 2023). The number of women entrepreneurs has increased, especially in micro and small businesses (Laksmanawati and Yuniawan, 2021). Their role in managing their own companies, as managers, or as employees has been able to make changes among women in general, both in rural and urban areas. The involvement of women in the economy has contributed significantly to India's GDP by about 16% in recent years (Woetzel, 2015).

To increase the added value of businesses led by rural women, which can contribute to sustainable development, the pivotal role of education cannot be overstated (Razmi and Firoozabadi, 2016; Mashapure et al., 2022). This aligns with Ghasemi et al. (2021), who state that rural women serve as the pillars of the social system and play a crucial role in fostering sustainable development. Education extends beyond the acquisition of theoretical knowledge; it encompasses the practical application of gained knowledge through training and skill development. Average years of schooling, a metric indicative of education level, demonstrates a positive correlation with the presence of female entrepreneurs (Razmi and Firoozabadi, 2016; Pasaribu et al., 2018; Tran et al.,

2021). Education is critical in increasing the number of female entrepreneurs in South Punjab, Pakistan; in Azerbaijan (Ahmadov et al., 2021); and in Australia (Tran et al., 2021). Ahmadov et al. (2021) found that education is the main factor influencing women's development and management of business. Van Vu's (2020) study, based on a survey of household living standards in Vietnam, found that education level positively affects household income.

However, women entrepreneurs in rural areas continue to face substantial challenges because the level of education generally extends only up to elementary school. Taskin et al. (2023) stated that education is an obstacle that can affect women entrepreneurs in micro, small and medium enterprises. This has greatly affected the competitiveness of the businesses they are engaged in, such as Saah (2022) for the case of South Africa. Increasing the competitiveness of micro and small businesses run by women is shaped by educational factors and other demographic factors such as age, number of family members, and work experience (Alsulami, 2018; Zveglich et al., 2019; Siman et al., 2020; Zubair Mumtaz and Smith, 2021; Yang et al., 2022; Dewi, 2022; Wahyuni et al., 2023; Chae and Heshmati, 2024). Work experience is human capital inherent in entrepreneurs (Goldin and Katz, 2016; Capelleras et al., 2015). Kraima (2023) found that the experience of small and medium entrepreneurs influences economic performance.

The Role of Education on Income: A Theoretical Perspective of Endogenous Growth through Human Capital

Education is an inseparable part of human capital. Endogenous growth theory has reinforced the importance of human capital as a production input (Romer, 2012). Endogenous growth theory explains that human capital includes abilities, skills and knowledge per worker. Skill changes in resources will lead to human and physical capital accumulation, which drives significant changes in output per worker. Following Kalaitzi (2018), the development of the Neoclassical growth theory model through human capital can be stated as follows:

$$Y_t = F(A_t L_t, {K_t}^{\alpha}, HC_t^{\beta}) \quad (1)$$

where Y is output, A is the level of technology, L is labor, K is capital, and HC is human capital. The development of the Neoclassical model assumes that $\alpha + \beta < 1$. This model explains that the higher the level of education a worker has, the higher the human capital they have. Judging from the microeconomic aspect of reality, each additional year of schooling increases individual wages by the same percentage. Suppose wages reflect individuals' labor services; output increases by creating human capital. In this model, human capital (HC) is workers who have

obtained education and skills, so the variables used are generally the average length of schooling and work experience (Goldin and Katz, 2016). Romer (2012) explains that human capital is the productive services that workers supply. The contribution of workers is different due to differences in skills and education. Thus, the more educated workers are, the higher their human capital, which will further increase output. The amount of human capital is as follows:

$$H(t) = L(t)G(E) \quad (2)$$

where L is the number of workers and E is education. G(E) is a function of human capital per worker as a function of years of schooling per worker. L in equation (1) can be interpreted as effective labor without additional education or symbolized as LG(0) and LG(E), namely the workforce that has received additional education. Then the difference is human capital, namely L{G(E)-G(0)} (Romer, 2012). Thus, the greater the average length of schooling of the workforce, the greater the accumulation of human capital, which means the workforce becomes more productive and increases output every year.

This study looks at the education of workers or micro and small business owners. For micro and small-scale businesses, the owners are generally workers. Hence, the Equation (1) model is also valid to use to increase the income of women's micro and small businesses. Through the endogenous growth theory approach, it is lowered into the business sector to observe whether human capital through education can increase women's business income. The Cobb-Douglas model Equation (1) can be modified based on the assumption that human capital is the number of workers working and has considered the level of education so that it becomes hL. Developing the endogenous growth theory model by emphasising the importance of human capital through research and education, we modified the Cobb-Douglas function into Equation (3) by including the women's business sector and control variables (Van Vu, 2020) as follows:

$$Y_{it} = K_{it}^{\beta}, hL_{it}^{\gamma}, \prod_{j=1}^{n} C_{jt}^{\emptyset j}\, e^{\varepsilon_{it}} \quad (3)$$

where i is women's micro-small business, t is time, and j is the type of control variable. C is a control variable. $\beta + \gamma > 1$ explains the increasing returns to scale on physical and human capital.

Based on a search of literature studies both on aspects of human capital theory and the results of empirical studies, this research examines two things comprehensively, namely the role of rural women engaged in micro and small businesses in increasing their income and the influence of women's education in

micro and small businesses on increasing income. This will then have an impact on the realization of sustainable rural development. According to Dawood et al. (2023), improving the quality of education services, especially in rural areas, can encourage the achievement of sustainable development goals.

Based on literature studies, this research comprehensively examines the role of rural women in micro and small businesses in boosting their income and how their education in these businesses contributes to income growth, which in turn could promote sustainable rural development.

Methodology

Data

This study uses primary data gathered from 132 respondents in coastal rural South Sulawesi, Indonesia. Sample selection employed a purposive technique, targeting female respondents who owned micro-small business units. These businesses predominantly utilise raw materials from fisheries and marine products. Data collection involved in-depth interviews using an open structured questionnaire. Primary data include education, age, family size, work experience, average income, capital, and government and private sector assistance. These variables are described in Table 1:

Table 1. Variable Descriptions

Variables	Descriptions
Education (Ed)	The length of study of the respondent (year). Duration of elementary school is six years, Junior high school is nine years, Senior high school is twelve years and College is fifteen years
Age (Ag)	The age of the respondents recorded at the time of the survey. (year)
Family Size (Fz)	Number of household members (people)
Work Experience (Exp)	The duration of respondents' business involvement (year)
Average income (Y)	The average income earned by women in a month (in rupiah)
Capital (Cap)	Initial capital is measured from all tools and equipment to produce the product (rupiah).
Government/private sector intervention (PI)	Respondents received assistance in the form of capital and training, measured by a Dummy Variable.

Analysis Model

This research employed two analysis models: quantitative and qualitative models. The quantitative analysis model consists of two components, namely statistical description and multiple regression analysis. Descriptive statistics aim to describe women's average income, capital average, education average, age average, work experience average, number of family members, and distribution of respondents based on income, capital, education, age, and work experience. Meanwhile, the multiple regression analysis model aims to analyse the influence of education and control variables on women's income from micro and small businesses. On the other hand, the qualitative analysis model has two objectives, namely (i) identifying the problems encountered by women in running their micro and small businesses and (ii) developing a model for empowering rural women to increase business competitiveness towards sustainable development. This model emphasises that in the long-term, the demands and needs of science, technology and innovation are necessary and strengthened by synergy and collaboration of various parties. Therefore, this research introduces a novel aspect which previous studies did not emphasize by developing a model aimed at increasing income through an empowerment framework, while also identifying the problems faced by micro and small business actors.

In the regression analysis model, apart from the education variable, several variables serve as control variables, including age, number of family members, work experience, and government intervention. Control variables are related to demographic factors such as age, number of family members, and work experience. The capital control variable follows the economic growth theory pioneered by Solow (Mankiw, 2021) and the new growth theory, which states that physical capital is the primary input in producing products and is vital for production for micro and small business actors.

The government's and other institutions' attention to women's businesses in rural areas is also quite significant. This study follows several previous researchers, such as Zavaleta Cheek and Corbett (2024). The policy variable is a dummy variable to see the intervention effectiveness from external parties. If the respondent received assistance from outside parties in the form of money or training, it was given a value of 1; otherwise, it was given a value of 0. The indicator of business competitiveness is the average net income of respondents.

Equation (3) is transformed into logarithms to become the following estimation equation:

$$LnY_{it} = \beta LnK_{it} + \gamma LnhL_{it} + \sum_{j=1}^{n} \emptyset_j \, LnC_{it} + \varepsilon_{it} \quad (4)$$

Equation (4) is modified by changing hL to Ed and describing each control variable so that it becomes the estimation equation as follows:

$$LnY_{it} = \alpha_{it} + \beta LnK_{it} + \gamma LnEd_{it} + \emptyset_{1it} LnAg_{it} + \emptyset_2 LnFz_{it} + \emptyset_3 LnExp_{it} + \emptyset_4 Dm_{it} + \varepsilon_{it} \quad (5)$$

All variables except the dummy variable were transformed into natural logarithms to explain the sensitivity of each change in the independent variable to changes in the income of women in micro and small businesses in coastal areas in South Sulawesi. i is respondent 1,2,3, …132. ε is the error term, and α is the constant, β,γ, $\emptyset_1$, $\emptyset_2$, $\emptyset_3$, $\emptyset_4$ are regression coefficients.

Results and Discussion

Descriptive Statistics of Respondent

Analysis of the characteristics of the respondents includes the level of education completed, the age of the household head, household size, and work experience or duration of involvement in micro and small businesses. These variables are theoretically linked to household income. On average, respondents completed 7.5 years of education, equivalent to the junior high school (SMP) level. Generally, respondents have completed intermediate education at the elementary school level for six years. However, some respondents have achieved a higher level of education, such as senior high school, which requires nine years of study. Attention to Table 2 on the Education variable shows that all respondents have received some form of education even if they did not graduate. The low level of education also affects work productivity and, in turn, influences competitiveness and income.

The average age of respondents was 38.8 years. If related to the age group of the population, the age of all respondents is classified as productive age. This has a positive impact on productive economic activities. The age group that carries out most micro and small business activities in coastal areas is the 30-year-old age group. Based on the respondents' work experience, the average respondent has been running a micro-small business for 7.5 years. This indicates that, on average, respondents have sufficient experience in carrying out business activities. However, some of them still have just started running their business. Family size is relatively low on average, namely three people per family, although some families have more than six people; however, the number is small. These family members also influence per capita income, so respondents' average per capita income is IDR 1.4 million per month. However, some respondents have a per

capita income of more than IDR 7 million monthly. This is reinforced by immense capital support so that the income obtained is also significant. The average monthly income of respondents is IDR 5.17 million per month, and the average monthly use of capital is IDR 2.4 million. The size of the capital used and the income obtained depend on the micro and small business type being run.

Table 2. Statistic Descriptive of Respondents

	Income	Capital	Age	Exp	Ed	Fz	y/capita
Mean	5178918.94	2490113.64	38.8	7.3	7.5	3.0	1443125.76
Median	2080000.0	1000000	38.0	4.0	6.0	3.0	765000
Mode	650000.0	200000	30.0	2.0	6.0	2.0	325000
Standard Deviation	6985040.11	3719438.03	10.4	6.9	2.1	1.2	1503205.32
Minimum	340000	100000	19.0	1.0	6.0	2.0	113333.333
Maximum	29960000	15000000	65.0	30.0	15.0	6.0	7125000
Count	132	132	132	132	132	132	132

Source: Research findings.

Approximately 59 per cent of respondents have completed elementary school, indicating a need for higher education levels. The relatively low education level also plays a role in fostering creativity in running their business ventures (Figure 1). The survey results showed that only 6.82 per cent of respondents had completed education from high school to college. With the rapid advances in technology, women who run micro and small businesses face big challenges in running their businesses if they are not accompanied by adequate knowledge. In the digital era, product marketing has shifted from conventional methods to online methods, product innovations are increasingly widespread, and the same products are entering rural areas and several others.

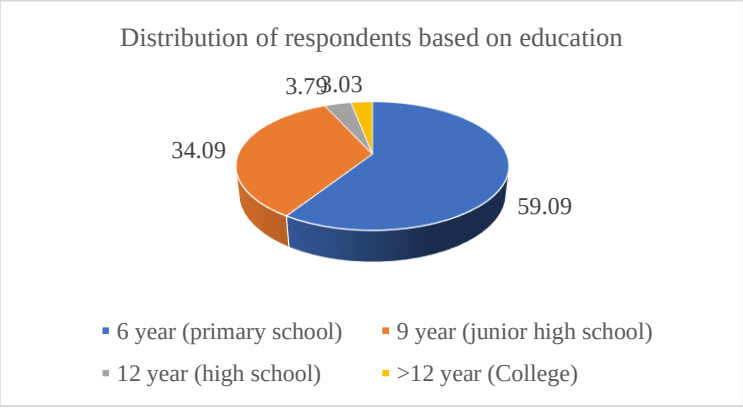

Figure 1. The Distribution of Respondents Based on Education
Source: Research findings.

Demographic factors, particularly age, increase business competitiveness. Women of more mature age often exhibit mature thoughts, a strong work ethic, high motivation, and perseverance. This maturity improves business productivity and income. However, as the age has surpassed the productive period, productivity level may also decline, leading to a decrease in income. Among the 132 micro and small entrepreneurs sampled, the age spectrum ranged from 19 years to a maximum of 65 years. The prevalent age among respondents was 30 years, with an average age of 38.8 years. The respondents are in the productive age group. It means that the age of 15-65 years is the effective period that tends to increase income, and those above 65 years will cause a decrease in women's income. Although the respondents' age is productive, their ages exhibit considerable diversity. Based on the age distribution, it was found that most respondents were aged 31- 45 years.

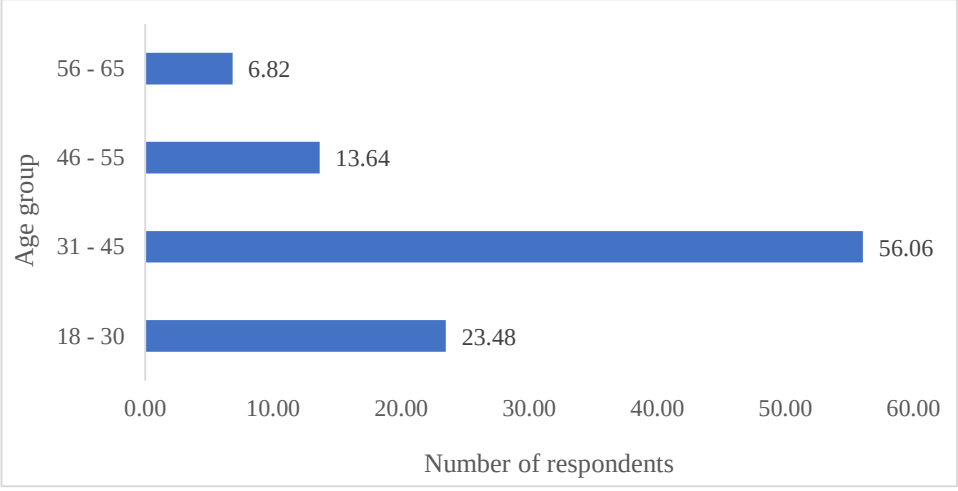

Figure 2. Distribution of Respondents Based on Age
Source: Research findings.

Additional factors influencing the respondents' income are household members. When female workers are single parents and have children who still need funds, the more members of the household, the more it encourages women to increase their income, and vice versa. However, the household members, in this case, children already working and still living with their parents, will affect household income. Based on the household survey, it was recorded that the number of household dependents ranged from 2 to 6 people or, on average, three people. The number of household members affects the income per capita. The more household members, the smaller the income per capita of the family, and vice versa.

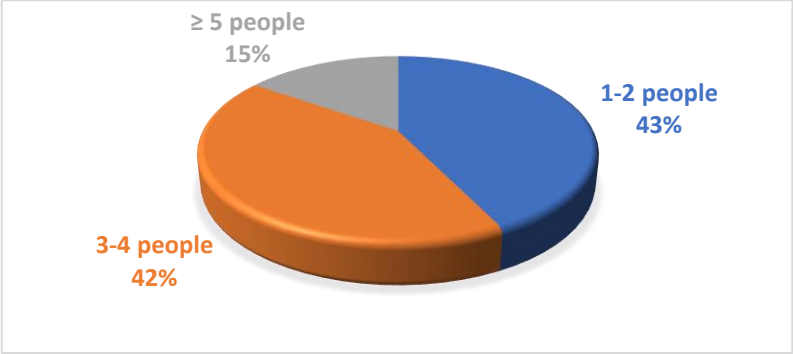

Figure 3. Distribution of Respondents Based on the Number of Household members
Source: Research findings.

Work experience is another factor that influences business competitiveness, which, in turn, encourages increased income. The characteristics of the respondents related to work experience were relatively varied, ranging from 1 year to 30 years. Respondents who have been in the business for a long time indicated that they have quite a lot of work experience. In general, work experience has a positive impact on income. Extended work experience is often related to increased work productivity. The survey found that out of 132 respondents, the average work experience was only 7.3 years, which is still relatively medium. Some respondents have just started a company with a business period of 1-2 years. This shows that the distribution of respondents according to the length of time they have run their business is quite diverse. About 12 percent of respondents have run micro, small businesses for 20-30 years. These micro and small businesses have been passed down from generation to generation.

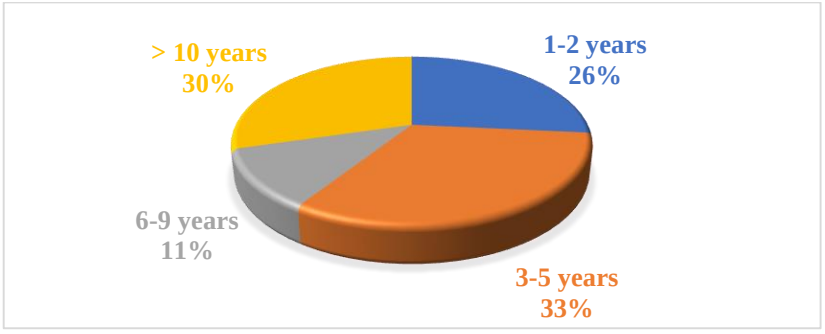

Figure 4. The Distribution of Respondents Based on Work Experience
Source: Research findings.

Analysis of Respondents' Income

Women's income from micro and small businesses is the leading family or household welfare indicator. The size of the income earned is reflected in the

ability of rural women to utilise fisheries and marine resources that are abundantly available in coastal areas. The higher the work productivity, the more competitive they are, which will then increase the income they earn. Increasing business competitiveness is determined by many factors; one of the most critical factors is education. Quality education can make rural women think and innovate to make fisheries and marine products economically valuable so that the number of micro and small businesses in rural areas grows positively. This means that both men and women are absorbing more and more workers. The subsequent impact creates a multiplier effect and reduces poverty. Under these conditions, sustainable rural development can be successful.

The types of work classified as micro and small businesses in coastal areas are diverse, thus influencing the size of the income earned by respondents. Several types of work carried out by women as micro and small business actors in coastal areas are selling fish, selling and processing seaweed, selling and processing salt, processing fishery and marine products into various types of food and drinks. In running their business, respondents' characteristics such as education, age, work experience, and number of family or household members also influence the increase in income earned.

Based on the survey results, it was found that respondents' monthly income varied greatly depending on the micro and small business and market accessibility. The highest average monthly income was IDR 29.9 million, and the lowest was IDR 340 thousand. The income inequality of respondents is quite large, as shown by the standard deviation value of Rp. 6.98 million. Respondents have relatively low incomes because their type of business only processes fish into meatballs and nuggets, and market access is minimal. Generally, they only market at the local level or around where the respondent lives. The micro and small businesses are group businesses, so their income is profit-sharing. Meanwhile, respondents with high incomes came from types of work such as wet fish traders, seaweed processors and salt processors. The amount of income obtained is strengthened by quite large capital support.

The number of respondents earning less than IDR 2 million is 50 percent of the total respondents. This indicates that many women micro and small entrepreneurs in rural areas, especially in coastal areas, still need higher incomes. The low revenue has an impact on meeting their daily life needs. The following result was an increase in the number of poor people. However, this study also notes that some female micro and small business actors have also earned sufficient income to meet their daily needs, as shown by 20.45 percent of respondents who

earn IDR 2 million to IDR 5 million. Overall, the percentage of respondents with a monthly income of more than IDR 5 million is 29.5 percent. Although the numbers are relatively minor, this study has provided a general picture suggesting that women micro and small entrepreneurs in rural areas have shown positive signs towards sustainable development.

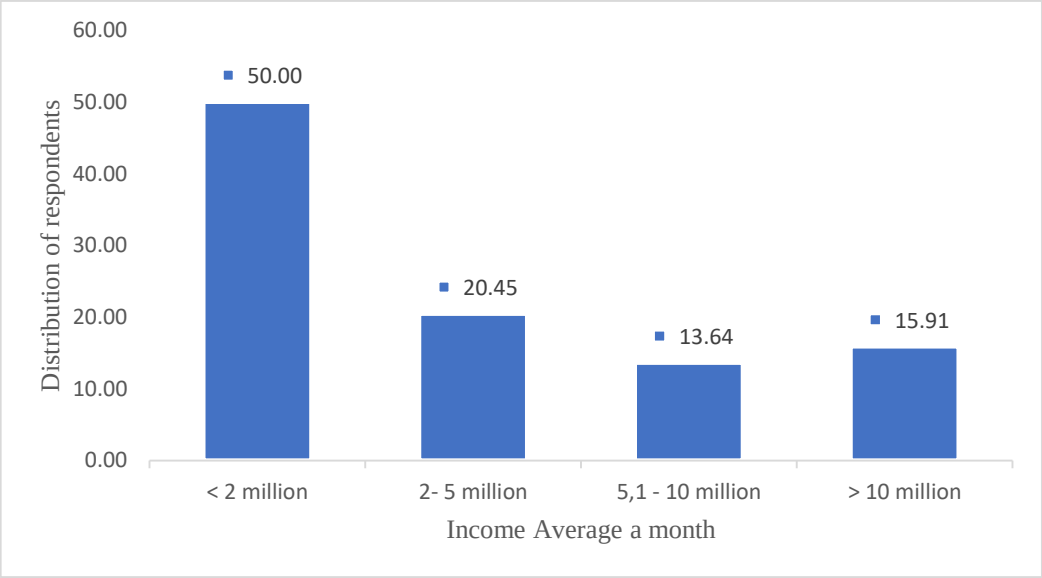

Figure 5. The Distribution of Respondents Based on Average Income
Source: Research findings.

The results of this survey prove that low education is correlated with the income earned. The analysis results show that, on average, respondents who completed only primary school education tended to have lower incomes than respondents who studied at a higher level. However, it can be accepted that the type of work also influences the income earned. Likewise, regarding the number of family members, although the average is relatively small, the respondents' motivation to earn income is quite large.

One interesting thing to observe is the initial capital used by respondents in opening micro and small businesses. The initial capital determines the type of work chosen and then impacts the income earned. Respondents with greater capital have incomes that parallel the capital they invest. Respondents with low capital can generally only buy simple equipment and fish meat grinders, such as small blenders, at affordable prices. The type of business pursued is a micro business carried out in groups. Around 9.09 per cent of respondents have capital above IDR 10 million and generally have jobs such as trading fish, seaweed and salt processing.

Analysis of Education Effect and Other Factors on Women's Micro and Small Entrepreneur's Income

Based on the estimation results, this study found that of the 6 (six) variables that have been tested, 4 (four) of them show coefficient signs according to theory and are statistically significant. These four variables are education, capital, external assistance, and number of household members. The other two variables, age and work experience, were not statistically significant. The education variable influences women's income with a coefficient value of 0.044. This explains that every additional year of women's education will increase income by 0.044 percent. The longer the respondent is in education, the wider the insight and knowledge gained. Perkins et al. (2013) explain that someone who has pursued higher education will also have a higher rate of return than someone who has only attended elementary school.

The knowledge and insight inherent in entrepreneurs play a crucial role in influencing intelligence, encouraging innovative thinking (Amorós et al., 2019) and (Amini Sedeh et al., 2022), and contributing to increased human capital (Grilli et al., 2023), ultimately leading to higher income. Innovative women consistently strive to introduce novel approaches to production and more efficient consumption. This statement aligns with the experiences of several respondents who have attained high school and above education levels, engaging in diverse business production. In the digital era, the use of simple equipment or technology is no longer relevant for small micro-business actors, who will shift to more modern technology. It reduces production costs and increases work efficiency (Ksenofontov et al., 2019). The positive relationship between education and the income of women micro and small entrepreneurs aligns with several previous empirical studies, such as those conducted in Vietnam (Van Vu, 2020) and Nigeria (Ahmadov et al., 2021).

Capital is another variable that statistically drives an increase in the income of women MSEs in coastal areas. Every 1 percent increase in initial capital will result in a 1.357 percent increase in women's income. Therefore, the higher the capital, the higher the production that can be produced. Previous studies, such as (Sessu et al., 2021) and (Liao et al., 2023), support the significance of capital in increasing economies of scale.

The number of household members also determines the income women earn as the head of the family. Two mechanisms strengthen this relationship: their children must still be categorized as workers or under 15. Female business actors strive to increase their income to meet the living needs of family members. Thus,

the increasing number of household members under working age requires women to increase their income by working additional hours or opening side businesses. If the household members or children have reached working age and start working, household income will also increase. Adding one household member is estimated to increase women's income by IDR 1.599 million. Previous studies examined the relationship between the number of household members and income, including (Kamuzora and Mkanta, 2000; Nursini et al., 2021; and Pitafi et al., 2022). These studies generally support the present finding that there is a relationship between income and family size. A large family often means more workers and, consequently, higher income.

Table 3. The Estimation Results of the Effect of Education on Women's Income

Descriptions	coefficient	p-value
Constant	0.220	0.000
Edu	0.044***	0.050
Age	-0.048ns	0.822
Exp	0.053ns	0.726
Fh	1.599***	0.000
Cap	1.357***	0.000
Ast (Dm)	0.554***	0.000
R2	0.80	
F-st	81.163	
Prob (F-Statistics)	0.0000	

Source: Research findings.
Note: ***The significance level is 5%.
ns =non-significant.

Government or private-sector assistance is one of the empowerment programs aimed at enhancing the capacity of women entrepreneurs. However, in many cases, women's empowerment programs, including training, additional capital, and equipment assistance, often fail to develop women's businesses. This indicates no significant difference in income earned between business actors who receive the program and those who do not. However, the estimation shows differences in income between program and non-program recipients. Business actors in rural areas are expected to increase their revenue through funding from the government or private sectors.

Sustainable development goals that align with this study include poverty alleviation, employment, and gender equality. The goal of sustainable rural

development relies on the ability of rural residents to manage the potential natural resources available in rural areas. Women's involvement in the public sphere, especially in economics and employment, is the primary asset for successful development. Based on the previous description, the average income of women micro and small entrepreneurs in coastal villages is around IDR 5.1 million per month. This figure is significantly higher than the average wage for Indonesian workers, which was 3.07 million per month in 2022 (BPS-Indonesian Statistics, 2023). This indicates that women's productive economic activities have great potential to contribute to sustainable development in rural areas. Women entrepreneurs who earn an average monthly income of IDR 3 - 5 million will create employment. They have created backward and forward effects in the production cycle. As a backward effect, there is an increased demand for fishery and marine products, encouraging farmers and fishermen to boost their production volume further. This implies a multiplier effect on farmers and fishermen in the agricultural/fishing sector and simultaneously impacts micro-business actors in the manufacturing and trade services sectors. Regarding forward effects, people's consumption needs are met.

The increase in demand for processed fishery and marine products impacts labour absorption through two channels: (i) the establishment of additional micro and small businesses, leading to an increase in micro and small business actors, creating a demand for new workers. (ii) Increasing economies of scale. For example, the micro business evolves to be a small business scale, or the small business scale becomes more considerable. Every shift in business scale status has an impact on labour absorption. The increase in micro and small business actors causes demand for production inputs from other development sectors, stimulating the creation of employment in different development sectors and so on. Thus, women's productive economic activities contribute to sustainable development by improving the overall welfare of society in rural areas.

The pivotal role of education cannot be overstated in encouraging improvements in the quality of women's micro and small business products. One of the critical indicators of the quality of micro and small business products is the ability of business actors to sell their products to a broader market, not only at the local level but also at national, regional and global markets. This capability hinges on the knowledge and skills of businesswomen, making education a fundamental catalyst for such achievement. With a higher level of education complemented by adequate skills, female entrepreneurs can innovate products and widen market access. However, the reality for micro and small economic actors in rural areas is

generally marked by a complex situation characterised by low education, low skill levels, limited knowledge of internet use, and several other challenges. This condition poses a significant challenge in the era of global competition.

Women's empowerment programs, including continuous education and training, must be prioritised to thrive amidst global competition. The importance of education aligns with the results of this study, where education plays a crucial role in enhancing the competitiveness of micro and small business products. Education positively influences women entrepreneurs' income growth in micro and small businesses. Training programs must be designed in such a way as to increase the knowledge and skills of businesswomen in innovating, accessing markets online, and improving business financial management to make it more efficient and effective. The involvement of multi-stakeholders such as central/regional/local government, non-governmental organisations, and local economic institutions in designing empowerment programs for micro-entrepreneurs is a necessity in the era of globalisation. The results of this study underscore the significance of external assistance from governments and NGOs in boosting the number of micro and small businesses in coastal areas. All strategic efforts undertaken by stakeholders involved in micro and small business products are to achieve sustainable development.

Identify the challenges faced by women micro and small business in coastal villages

The abundant natural resources on the coast are the main source of income for coastal women. These women process and transform the fisheries and marine products into a variety of goods. As a result, these productive activities have led to the rapid growth of micro and small businesses in rural areas, offering the promise of contributing to sustainable development.

Nevertheless, the management of these micro and small businesses still encounters a range of challenges. Based on a survey of 132 respondents, several problems faced by women entrepreneurs were grouped into three: (i) production input, (ii) production process, and (iii) marketing. In the production input aspect, women entrepreneurs experience limited quantity and high prices of raw materials, along with a lack of capital, low quality of workers and business owners. The increase in raw material prices, particularly during the rainy season, discourages many fishermen from working, leading to reduced fish supplies available in the market. Despite successfully accessing the market, many female entrepreneurs still struggle to secure sufficient capital to meet local demand. Moreover, business management is also hindered by a lack of a skilled workforce

and competent business owners. In terms of the production process, the issues include limited output, low production quality, and the high reliance on basic technology. Numerous women entrepreneurs along the coast often neglect the products' quality, leaving them unable to compete with non-coastal products. Finally, in terms of marketing, women entrepreneurs generally encounter challenges such as a limited market, inadequate promotion, low-quality product packaging, and lack of expertise in marketing their digital-based products.

These challenges can be addressed through empowerment programs. Empowerment programs for women entrepreneurs on the coast, through education, training and mentoring, can significantly enhance their knowledge and skills. These programs enable entrepreneurs who lack raw materials to develop their businesses by utilizing alternative resources. Additionally, those facing capital constraints can collaborate with other entrepreneurs or join local institutions like Village-Owned Enterprises (BUMDesa), cooperatives and regional financial institutions. Furthermore, training and mentoring can help those who are currently producing at a low standard, to improve the quality of their products by adopting the recent technology. At this stage, some empowerment programs have been carried out, but the effectiveness of implementing such programs still depends on various factors. These include the level of awareness of entrepreneurs to change, the commitment of the relevant agencies for program sustainability, marketing facilities and infrastructure, and the ability of women entrepreneurs to adopt modern technology.

Model of Empowering Women in Micro and Small Enterprises in Coastal Areas

The challenges encountered by rural women, particularly micro and small business entrepreneurs, seem to be complex. The complexity of this problem requires the intervention of various parties to overcome those problems. Rural women, as the principal capital for development in villages, need to receive priority development programs that are integrated and synergistic from all stakeholders. Thus, women entrepreneurs in rural areas should be encouraged to increase their level of competitiveness, helping them to develop and scale up their businesses from micro to small-scale, small to medium-scale, and eventually medium to large enterprises. At a broader level, this empowerment can contribute to boosting economic growth, reducing unemployment rates, mitigating poverty, and narrowing the income gaps between society's groups.

The women's empowerment model is designed based on the needs of entrepreneurs. Entrepreneurs requiring financial management skills should

receive training in preparing financial reports. Those facing challenges in product packaging need assistance and training in quality packaging techniques. Meanwhile, those who are constrained by low product quality can get training and assistance in production techniques using recent technology. Moreover, the issues faced by coastal women are pretty diverse, so the role of stakeholder involvement based on program synergy is necessary. Universities, as institutions with professional resources, can contribute to encouraging increased productivity and business competitiveness for rural women through research and community service in the form of training and mentoring as well as marketing. Government institutions can provide adequate infrastructure support, such as internet networks, galleries, facilities for access to capital, and training. Additionally, private institutions play a role in marketing products, working together in designing business models and collaborating to strengthen networks. Furthermore, NGOs play a role in selecting quality raw materials, accessing markets and funding, and providing various training and assistance. The collaborative efforts of stakeholders in empowering coastal women through synergy programs can ensure quality, promote their businesses, and establish market certainty. These efforts can lead to high productivity and competitiveness in coastal women's businesses, ultimately contributing to sustainable development in rural areas. The model illustrating this empowerment process is depicted in the following figure.

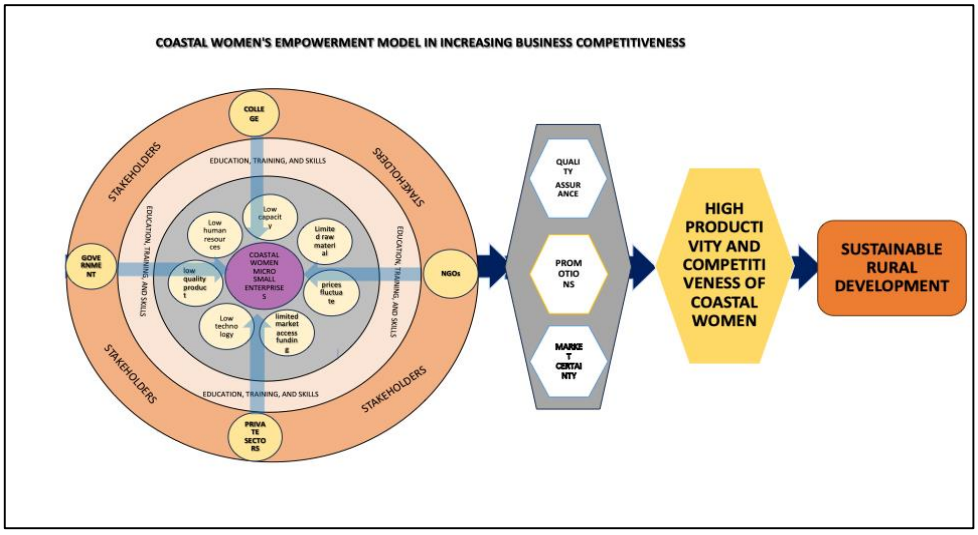

Figure 6. Coastal Women's Empowerment Model in Increasing Business Competitiveness

Source: Nursini (2024).

Conclusion

Rural women are valuable development resources who play a significant role in promoting sustainable development in rural areas, especially in coastal areas rich in fisheries and marine resources, which are an alternative source of livelihood for women. Women in coastal areas generally carry out productive economic activities based on family businesses, such as processing fisheries and marine products. Processed products with various product variations are categorized as micro and small businesses. Even though the business scale is still classified as micro and small, its contribution to family income is enormous. The income earned through women's entrepreneurship in micro and small businesses must be balanced with education. Even though the education level of women in coastal villages is relatively low, the regression analysis proves that education influences the increase of women's micro and small businesses. This explains that education is crucial for women engaged in micro and small businesses. Several other variables affecting women's micro and small businesses include capital, the number of family members, and supportive intervention from government institutions and NGOs.

The importance of education for coastal women is marked by the complexity of the problems and challenges they encounter in operating their business, ranging from sourcing production inputs, managing the production process, and marketing their products. The complexity of these problems can be addressed through a model of women's empowerment through education and training based on synergy and collaboration between stakeholders. The medium and long-term impact of education and training will provide quality assurance, promotion and market certainty, which are measured through increased production, productivity and competitiveness, further contributing to sustainable development in rural areas.

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