The Dynamic of Women Entrepreneurs, Environmental Awareness, and Family Welfare: A Green Economy Perspective

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Article Info	ABSTRACT
	This study aims to analyze the impact of strengthening the potential of women entrepreneurs on family welfare, with environmental awareness as a moderating variable within the green economy perspective. An explanatory quantitative method was used, employing purposive sampling involving 200 women entrepreneurs in Indonesia engaged in sustainable business practices. Data were collected through surveys and analyzed using SmartPLS, including validity and reliability tests, classical assumption tests (multicollinearity, heteroscedasticity, normality), and moderated regression analysis. The findings indicate that strengthening the potential of women entrepreneurs has a positive and significant impact on family welfare, and environmental awareness enhances this relationship. The practical implications of this study highlight the importance of integrating sustainability values into women entrepreneurs' empowerment to sustainably improve family welfare. The theoretical implications contribute to the literature on women's entrepreneurship and the green economy. However, this study has limitations, as it does not measure other variables that may affect family welfare. Future research is recommended to include more contextual variables and involve a broader population.

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Introduction

Women entrepreneurs add value both to their family life and social life. They are also actively involved in business activities at all levels, making significant contributions to economic growth [1]. In Indonesia, the Central Bureau of Statistics reported an economic growth rate of 5.04% in 2023 [2]. Entrepreneurs and Micro, Small, and Medium Enterprises (MSMEs) are the driving forces behind Indonesia's economic Strengthening. According to data from the Ministry of Cooperatives and SMEs, the MSME sector contributes 61% to the Gross Domestic Product (GDP), equivalent to IDR 9,580 trillion. MSMEs also account for 97% of total employment absorption [3].
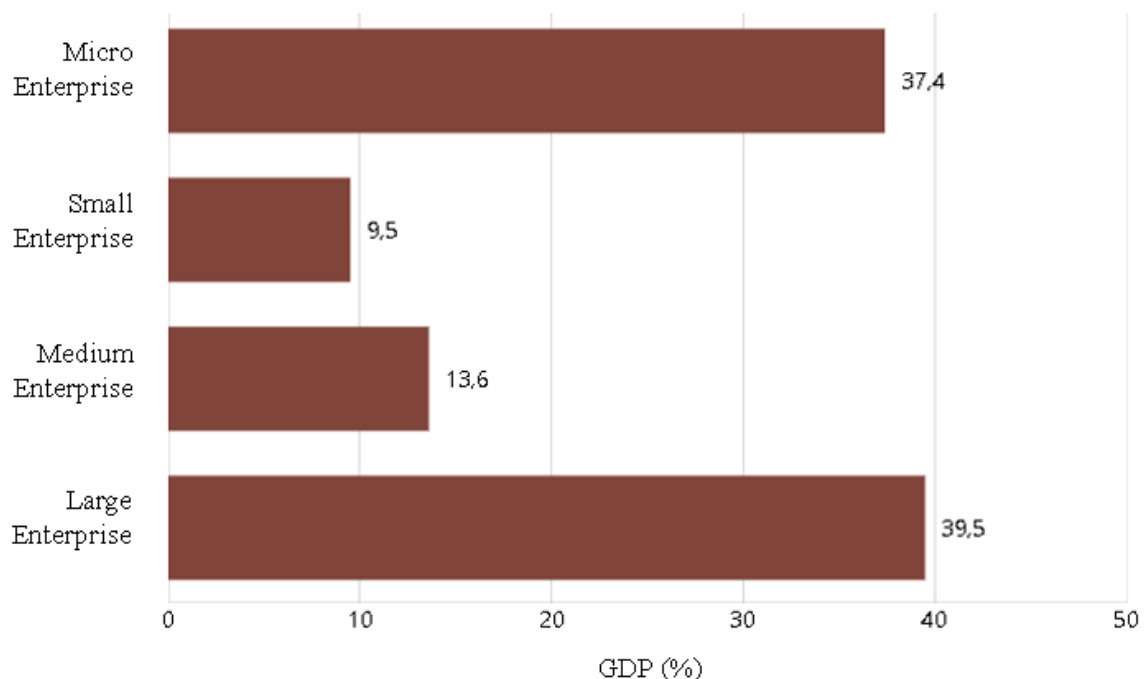

Figure 1. The Proportion of Indonesian MSMEs' Contribution to GDP

In the context of Indonesia's economy, women play a significant role as entrepreneurs and MSME operators [4]. According to previous study, approximately 64.5%

of MSMEs are managed by women, while the remaining 35.5% are managed by men [5]. Women's involvement in entrepreneurial activities contributes to improving family welfare, as they allocate 90% of their income to family health, education, and community Strengthening [6]. The substantial impact of women in entrepreneurship has encouraged the government to empower them through capacity-building programs such as education and training [7]. These efforts aim to provide women entrepreneurs with better access to resources and business opportunities, thereby enhancing their contribution to sustainable economic growth.

As part of efforts to achieve sustainable economic growth, environmental awareness is becoming increasingly important in business activities, including in the MSME sector, which is dominated by women entrepreneurs. This aligns with the green economy concept, which not only focuses on economic growth but also on preventing environmental degradation and declining environmental quality [8]. The urgency of implementing the green economy concept in Indonesia is heightened by the ongoing environmental crisis. According to a World Bank report, Indonesia was the world's fifth-largest waste-producing country in 2020 [9].
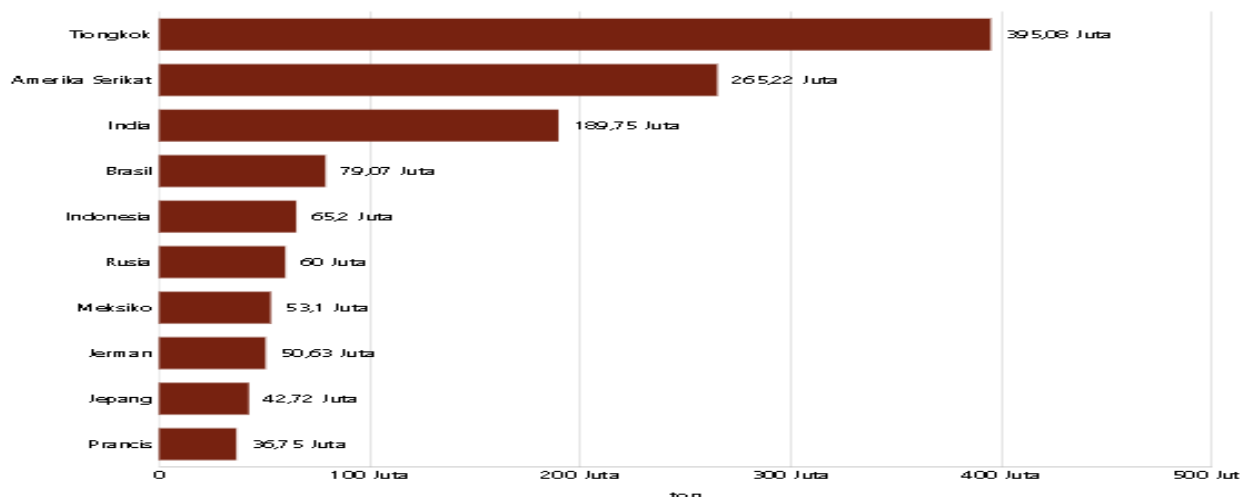
Figure 2. The World's Largest Waste-Producing Countries

Indonesia's waste production of 65.2 million tons consists of 39.1% from household waste, 20.4% from traditional markets, 17.8% from commercial centers, and the remaining 22.7% from offices, public facilities, residential areas, and other sources [10].
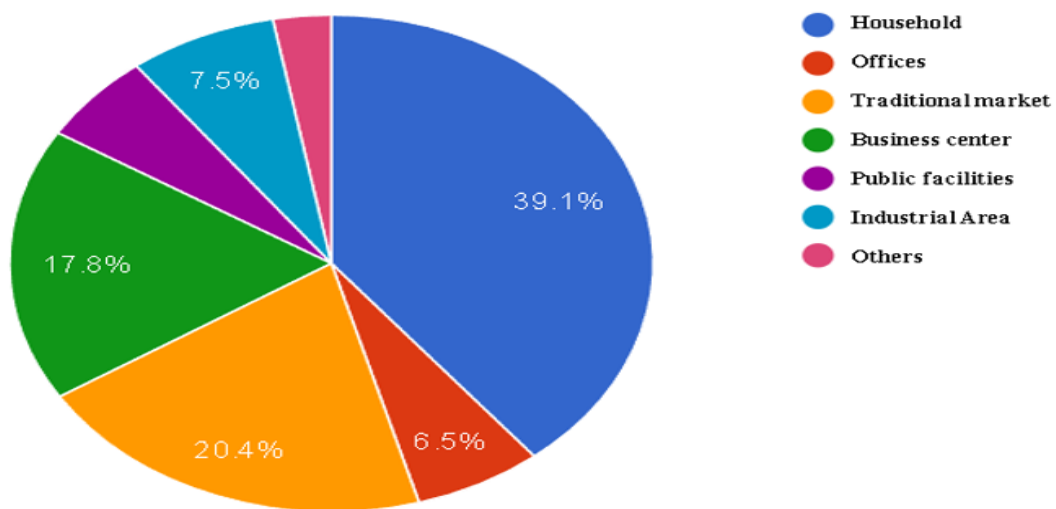
Figure 3. Waste Composition by Source

The significant role played by women entrepreneurs in improving family welfare amid the challenges of the environmental crisis serves as the background for this study. Based on this background, the research question is formulated as follows: How does environmental awareness moderate the relationship between strengthening women's entrepreneurial potential and family welfare from a green economy perspective? The urgency of this research is further reinforced by Indonesia's declining environmental quality, partly due to household and business activities that generate increasing amounts of waste. From literature review, it is known that strengthening women's entrepreneurial potential has a positive and significant impact on family welfare [7]. Environmental awareness and eco-friendly business activities can strengthen the relationship between women's entrepreneurial potential and family welfare [11]. Community empowerment through environmentally-based entrepreneurship training has great potential for improving community economic conditions [12]. Environmental factors significantly impact women's entrepreneurial

activities as a means of enhancing family welfare [13]. However, field observations indicate that the adoption of green economy concepts remains low, especially among MSMEs [14].

In the context of sustainability, there is a research gap that needs to be addressed. Although women entrepreneurs have contributed significantly to family welfare, the adoption of sustainable business practices aligned with the green economy concept remains low [15]. Previous studies have shown that eco-friendly business activities can enhance the positive impact of entrepreneurship on family welfare [16]. However, there are still few studies exploring how environmental awareness moderates the relationship between strengthening women's entrepreneurial potential and family welfare, particularly in the green economy context. This research is based on the Resource-Based View (RBV) theory, which states that internal resources, such as entrepreneurial potential, can influence business performance and family welfare [17]. In this context, women's entrepreneurial potential serves as a key resource, whose impact on family welfare can be strengthened through environmental awareness as a moderating variable. The conceptual model of this study links the following variables: 1) Strengthening Women's Entrepreneurial Potential as the independent variable, 2) Family Welfare as the dependent variable., 3) Environmental Awareness as the moderating variable that strengthens the relationship between the independent and dependent variables.

This study aims to analyze the impact of strengthening women's entrepreneurial potential on family welfare and examine the role of environmental awareness as a moderating variable in strengthening the relationship between women's entrepreneurial potential and family welfare. The theoretical contribution of this research is to enrich the literature on women's entrepreneurship and the green economy, particularly in the context of environmental awareness moderation. This study also proposes a new conceptual model integrating entrepreneurial potential and sustainability values. Practically, the findings of this research are expected to be useful for policymakers and women's empowerment institutions in developing programs focused on strengthening women's entrepreneurship

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while emphasizing the importance of eco-friendly business practices to sustainably improve family welfare.

Method

This study employs an explanatory quantitative approach to measure and analyze the relationships between the examined variables. The hypotheses are tested based on primary data collected through surveys of female entrepreneurs in Indonesia who meet specific criteria. The operational definitions of the variables used in this study are as follows: 1) Strengthening Female Entrepreneurial Potential (X): Measured based on access to entrepreneurial education, business management capabilities, and availability of resources, 2) Environmental Awareness (Z): Awareness and eco-friendly practices applied in business, 3) Family Welfare (Y): The welfare condition of a family in terms of economic, social, and health aspects. All variables are measured using a 5-point Likert scale, ranging from 1 ("strongly disagree") to 5 ("strongly agree"). This scale is used to assess responses to each indicator of the variables. The sample size determination employs purposive sampling with the following criteria: (a) female entrepreneurs who have environmental awareness or engage in sustainable business practices, and (b) have participated in programs focused on enhancing female entrepreneurial potential with sustainability values. The study involves 200 respondents who meet these criteria. The sample size determination is based on the Structural Equation Modeling (SEM) approach, with a recommended minimum of 5–10 times the number of indicators in the model.

Data is collected through an online survey using a questionnaire distributed to respondents who meet the sample criteria. The questionnaire is designed to gather data on entrepreneurial potential strengthening, environmental awareness, family welfare, and supporting demographic variables. The collected data is filtered first to identify incomplete or anomalous responses. The cleaning process involves removing responses that are incomplete or inconsistent. Valid data is then analyzed using SmartPLS. The analysis includes measurement model evaluation (validity and reliability testing), classical assumption tests (multicollinearity, heteroscedasticity, normality), hypothesis testing using

Moderated Regression Analysis (MRA) to examine the role of environmental awareness as a moderating variable. The measurement model evaluation is conducted using SmartPLS through the following steps. Validity Testing: convergent validity is assessed using loading factor (>0.70) and Average Variance Extracted (AVE >0.50) while discriminant validity is tested by comparing the square root of AVE with inter-variable correlations. Reliability Testing: measured using Cronbach's Alpha and Composite Reliability (values >0.70 are considered reliable). Structural Model Evaluation: multicollinearity test is conducted using Variance Inflation Factor (VIF <5) to ensure no collinearity issues among variables. In addition, adjusted R^2 is used to evaluate the ability of independent and moderating variables in explaining the dependent variable.

Results and Discussion

This study employs an explanatory quantitative approach to measure and analyze the relationships between the investigated variables. Primary data collection was conducted through an online survey distributed to 200 respondents using a purposive sampling method. The following are the demographic data of the respondents:

Table 1. Demographic Data of Respondents

Demographic Profile		Frequency	%
Marital Status	Maried	134	67%
	Single	42	21%
	Divorced	17	8,5%
	Widowed	7	3,5%
Number of Dependents	0-2	116	58%
	3-5	68	34%
	6-8	11	5,5%
	>8	5	2,5%
	Salary/wages	102	51%
	Business or enterprise	78	39%
Main Source of Income	Investment	11	5,5%

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	Government/other assistance	9	4.5%
Additional Source of Income	Salary/wages	74	37%
	Business or enterprise	89	45%
	Investment	22	11%
	Government/other assistance	15	7%
Business Age	<1 year	47	23,5
	1-3 years	42	21
	3-5 years	46	23
	5-10 years	53	26,5
	>10 years	12	6

Source: Data of Respondents

The demographic data above show a total of 200 respondents. Among them, 67% are married, 21% are single, 8.5% are divorced, and 3.5% are widowed. In terms of dependents, 58% have 0-2 dependents, 34% have 3-5 dependents, 5.5% have 6-8 dependents, and 2.5% have more than 8 dependents. Regarding their primary source of income, 51% receive wages/salaries, 39% earn from businesses, 5.5% rely on investment returns, and 4.5% receive government or other assistance. As for additional income sources, 37% earn wages/salaries, 45% generate income from businesses, 11% from investments, and 7% receive government or other assistance. Based on the age of their business, 23.5% have been running their business for less than one year, 21% for 1-3 years, 23% for 3-5 years, 26.5% for 5-10 years, and 6% for more than 10 years. The following steps were taken to test the model using SmartPLS:
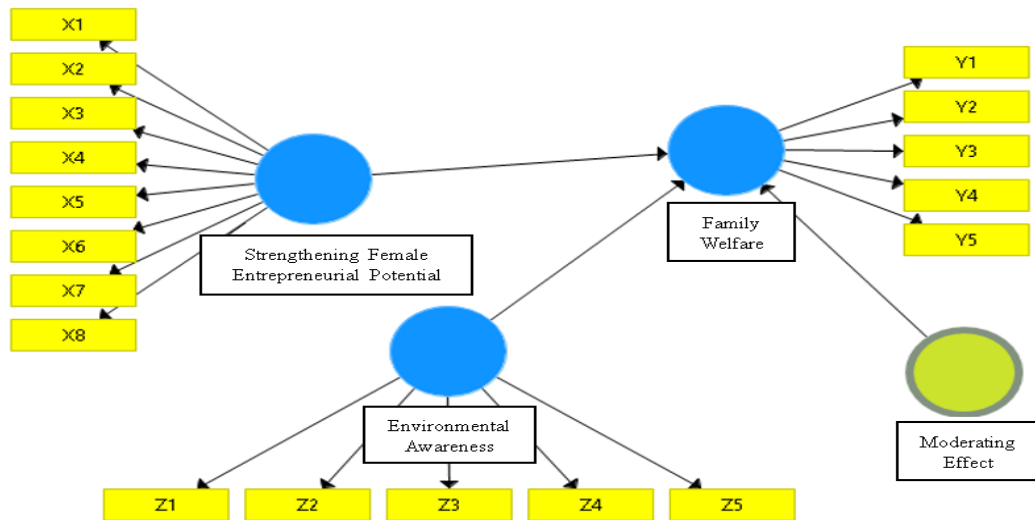
Figure 4. Data Testing Model Using SmartPLS

Validity Testing

Convergent validity is measured through loading factor values (>0.70) and AVE (>0.50). Discriminant validity is tested by comparing the square root of AVE with inter-variable correlations [17].

Table 2. Loading factor

Code	Loading	Evaluation
X1	0.725	Valid
X2	0.759	Valid
X3	0.710	Valid
X4	0.775	Valid
X5	0.803	Valid
X6	0.806	Valid
X7	0.811	Valid
X8	0.802	Valid
Y1	0.831	Valid
Y2	0.862	Valid
Y3	0.889	Valid
Y4	0.900	Valid
Y5	0.781	Valid

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Z1	0.786	Valid
Z2	0.893	Valid
Z3	0.896	Valid
Z4	0.758	Valid
Z5	0.891	Valid

Source: SmartPLS Data Processing Results

Based on data processing results, all indicators in this study showed loading factor values above 0.70. This indicates that each indicator has a strong contribution to measuring the studied constructs [18]. Indicator X (X1–X7) has loading factor values ranging from 0.703 to 0.811, indicating that all indicators are valid in measuring the construct of women's entrepreneurial potential strengthening. Indicator Y (Y1–Y5) has higher loading factor values, ranging from 0.781 to 0.900, showing strong validity in representing the family welfare variable. Indicator Z (Z1–Z5) also has high loading factor values, ranging from 0.786 to 0.896, indicating a significant contribution to measuring the environmental awareness variable. Thus, all indicators used in this study meet the criteria for convergent validity, as they have loading factor values above 0.70. This indicates that each indicator has a strong correlation with the latent variable it measures and can be used for further analysis.

Table 3. Average Variance extracted (AVE)

Code	AVE	Evaluation
X	0.600	Valid
Y	0.729	Valid
Z	0.717	Valid

Source: SmartPLS Data Processing Results

Based on the data processing results, the Average Variance Extracted (AVE) value for each variable exceeds 0.50, fulfilling the convergent validity criteria. Variable X (Women's Entrepreneurial Potential Strengthening) has an AVE value of 0.600, indicating that the indicators used explain about 60% of the variance in this construct. This suggests that the measurement of this variable effectively represents the studied concept. Variable Y (Family Welfare) has an AVE value of 0.729, meaning approximately 72.9% of the variance

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is explained by the indicators. Variable Z (Environmental Awareness) has an AVE value of 0.717, meaning about 71.7% of the variance is explained by its indicators. This confirms that the environmental awareness measurement is strong and valid in reflecting the studied construct. Thus, all variables in this study can be considered valid based on AVE values, indicating that each indicator significantly contributes to measuring the latent construct it represents.

Reliability Testing

Reliability is measured through Cronbach's Alpha and composite reliability, with values >0.70 considered reliable.

Table 4. Composite Reliability dan Cronbach's Alpha

Code	Cronbach's Alpha	Composite Reliability	Evaluation
X	0.906	0.923	Reliabel
Y	0.906	0.931	Reliabel
Z	0.900	0.927	Reliabel

Source: SmartPLS Data Processing Results

Based on data processing using SmartPLS, construct reliability is measured using Cronbach's Alpha and Composite Reliability [19]. A Cronbach's Alpha value above 0.70 indicates that the indicators for each variable have good internal consistency. Meanwhile, a Composite Reliability value above 0.70 suggests a high level of reliability. Variable X (Women's Entrepreneurial Potential Strengthening) has a Cronbach's Alpha value of 0.906 and a Composite Reliability of 0.923, indicating that the instrument used to measure this variable has very good internal consistency. Variable Y (Family Welfare) has a Cronbach's Alpha of 0.906 and Composite Reliability of 0.931, suggesting that the indicators for this variable are highly reliable. Variable Z (Environmental Awareness) has a Cronbach's Alpha of 0.900 and Composite Reliability of 0.927, indicating a high level of reliability. Thus, all variables in this study are reliable, as they have Cronbach's Alpha and Composite Reliability

values above 0.70, demonstrating that the measurement instruments used in this study are dependable and provide consistent results.

Structural Model Evaluation

Multicollinearity testing was conducted using VIF (<5) to ensure there were no collinearity issues between variables [20]. Additionally, Adjusted R^2 was used to evaluate the ability of independent and moderating variables to explain the dependent variable.

Table 5. Variance Inflation factor (VIF)

Code	VIF	Evaluation
X1	2.592	No multicollinearity issues
X2	2.949	No multicollinearity issues
X3	1.977	No multicollinearity issues
X4	2.164	No multicollinearity issues
X5	2.270	No multicollinearity issues
X6	2.463	No multicollinearity issues
X7	2.525	No multicollinearity issues
X8	2.436	No multicollinearity issues
Y1	2.293	No multicollinearity issues
Y2	2.782	No multicollinearity issues
Y3	3.158	No multicollinearity issues
Y4	3.322	No multicollinearity issues
Y5	1.820	No multicollinearity issues
Z1	2.099	No multicollinearity issues
Z2	3.559	No multicollinearity issues
Z3	2.997	No multicollinearity issues
Z4	1.859	No multicollinearity issues
Z5	3.584	No multicollinearity issues

Source: SmartPLS Data Processing Results

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Variance Inflation Factor (VIF) values were used to measure the degree of collinearity among independent variables in the model. Typically, a VIF value above 5 indicates collinearity issues that may affect regression analysis results [21]. From the table above, all indicators have VIF values below 5, meaning there are no collinearity issues in this research model. Therefore, variables X (Women's Entrepreneurial Potential Strengthening), Y (Family Welfare), and Z (Environmental Awareness) can be used together in the analysis without the risk of high multicollinearity. These results indicate that the research model has good quality regarding variable independence, allowing for more accurate interpretation of regression analysis results without being influenced by high indicator correlations.

Table 6. Adjusted R-Square

Construct	R-square Adjusted
Y	0.325

Source: SmartPLS Data Processing Results

Based on the Adjusted R-Square analysis, the value of 0.325 indicates that independent variables in the model explain only 32.5% of the variation in the dependent variable (Y - Family Welfare), while the remaining 67.5% is explained by other factors outside this research model. The relatively low Adjusted R-Square value suggests that although Women's Entrepreneurial Potential Strengthening and Environmental Awareness influence Family Welfare, their impact is still limited. This implies that other variables, such as household income, access to education, social support, or government policies on women's empowerment, may significantly contribute to explaining family welfare. Therefore, to strengthen future research models, exploration can be conducted on other factors that potentially influence family welfare, such as household income, access to education, social support, or government policies related to women's empowerment.

Table 7. Path Coefficients

	X	**Z**	**Y**
X			0.374
Z			0.245

Source: SmartPLS Data Processing Results

Based on the above evaluation, it can be concluded that variable X (Women's Entrepreneurial Potential Strengthening) and Z (Environmental Awareness) positively influence variable Y (Family Welfare), as indicated by coefficient values greater than zero. Variable X (Women's Entrepreneurial Potential Strengthening) has a coefficient of 0.374, meaning that each one-unit increase in X increases Y (Family Welfare) by 37.4%, assuming other variables remain constant. This indicates that X has a relatively strong influence on Y. Variable Z (Environmental Awareness) has a coefficient of 0.245, meaning that each one-unit increase in Z increases Y by 24.5%, assuming other variables remain constant. While this effect is positive, it is lower than that of X. Thus, it can be concluded that X (Women's Entrepreneurial Potential Strengthening) is the dominant variable influencing Y (Family Welfare) compared to Z (Environmental Awareness). However, both variables contribute positively to the dependent variable.

Table 8. T-statistics

	Original Sample	**Sample Mean**	**Std. Deviation**	**T-statistics**	**P Values**
X	0.374	0.388	0.087	4.285	0.000
Z	0.245	0.254	0.118	2.074	0.039

Source: SmartPLS Data Processing Results

Based on the table above, it can be analyzed that both the independent variable (X) and the moderating variable (Z) have a significant influence on the dependent variable (Y), as evidenced by a T-statistic value greater than 1.96 and a P-value of less than 0.05. The variable X (Strengthening of Women's Entrepreneurial Potential) has a T-statistic of 4.285 and a P-value of 0.000, which means that X (Empowerment of Women's Entrepreneurial Potential) significantly affects Y (Family Welfare) at a 5% significance level. In other words,

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the effect of variable X (Empowerment of Women's Entrepreneurial Potential) on Y (Family Welfare) does not occur by chance and can be considered reliable. The variable Z (Environmental Awareness) has a T-statistic of 2.074 and a P-value of 0.039, which also indicates that this moderating variable has a significant influence on the dependent variable Y (Family Welfare). Moreover, based on the hypothesis test using Moderated Regression Analysis (MRA), it can be concluded that environmental awareness (Z) as a moderating variable strengthens the relationship between the strengthening of women's entrepreneurial potential (X) and family welfare (Y). In other words, the higher the environmental awareness, the stronger the relationship between the strengthening of women's entrepreneurial potential and family welfare.

Discussion

This study aims to analyze the effect of strengthening women's entrepreneurial potential on family welfare, with environmental awareness as a moderating variable. Based on the analysis results, the following discussion relates to the hypotheses and their implications :

Hypothesis 1: Strengthening Women's Entrepreneurial Potential Positively Affects Family Welfare. The research findings indicate that strengthening women's entrepreneurial potential has a positive and significant impact on family welfare. This finding aligns with the Resource-Based View (RBV) theory, which suggests that internal resources such as women's entrepreneurial skills and knowledge can enhance business performance and, ultimately, improve family welfare [22]. In this context, increasing women's entrepreneurial potential, such as access to entrepreneurship training and capital, has been proven to have a direct impact on family welfare.

This study is also consistent with previous research, which shows that women's empowerment in entrepreneurship contributes to family welfare through increased income and access to resources [23][24][25]. These findings support existing literature on the

importance of women's economic empowerment programs in improving their living standards.

Hypothesis 2: Environmental Awareness Strengthens the Relationship Between Strengthening Women's Entrepreneurial Potential and Family Welfare. The second hypothesis is also supported by the data, showing that environmental awareness strengthens the positive relationship between strengthening women's entrepreneurial potential and family welfare [5]. This finding indicates that environmentally friendly business practices not only provide economic benefits but also have a positive impact on social aspects, such as family welfare. These results are consistent with the green economy concept, which emphasizes the importance of sustainability in business activities.

This finding also supports previous studies showing that entrepreneurs who run sustainable businesses tend to achieve better welfare, both financially and socially [4]. The implication of this result is that integrating sustainability values into business can enhance the positive impact of women's entrepreneurship on their families.

Theoritical Implications

Theoretically, this study contributes to the literature on women's entrepreneurship and the green economy. It enhances the understanding of how environmental awareness can moderate the relationship between strengthening entrepreneurial potential and family welfare. Additionally, this research enriches the Resource-Based View (RBV) theory by incorporating sustainability as a crucial resource in improving family welfare through women's entrepreneurship. This study strengthens the Resource-Based View (RBV) theory by demonstrating that enhancing women's entrepreneurial potential as an internal resource contributes to family welfare [26]. The findings support previous empirical studies stating that improving skills, access to capital, and entrepreneurship training can enhance household economic stability [27].

Furthermore, this study introduces a new perspective by incorporating environmental awareness as a moderating variable. The findings align with previous research indicating that sustainable business practices not only improve business performance but also provide

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social and economic benefits for entrepreneurial families [28][29]. Thus, this research contributes to the literature on women's entrepreneurship and the green economy, emphasizing that sustainability factors can strengthen the relationship between entrepreneurial potential and family welfare. These results are also consistent with studies highlighting that women entrepreneurs who adopt sustainability principles tend to have higher competitiveness and can sustain their businesses in the long term [30]. Therefore, this study provides empirical evidence that integrating environmental awareness into women's entrepreneurship is not merely a trend but a crucial factor contributing to improved family welfare.

Conclusion

This study aims to analyze the impact of strengthening women's entrepreneurial potential on family welfare, with environmental awareness as a moderating variable. Based on an analysis of 200 female entrepreneurs in the MSME sector, the findings indicate that : 1) Strengthening women's entrepreneurial potential has a positive and significant effect on family welfare. This result suggests that increased access to entrepreneurship training, business capital, and business skills contributes to higher household income. Additionally, the majority of respondents stated that their family's financial stability improved after engaging in entrepreneurial activities. 2) Environmental awareness strengthens the relationship between enhancing women's entrepreneurial potential and family welfare. Female entrepreneurs who adopt sustainable business practices can optimize resource utilization and enhance their family's economic stability.

The findings also indicate that, beyond entrepreneurship and environmental awareness, other factors may influence family welfare, which were not covered in this study. Therefore, future research is recommended to identify additional factors that could moderate or mediate the relationship between women's entrepreneurship and family welfare.

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