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Remanufacturing Sustainability Indicator (RSI) Scores and Determining Factors of Fashion MSMEs in Adopting Circular Economy

Nilai Indikator Keberlanjutan Remanufaktur (RSI) dan Faktor Penentu UMKM Fesyen dalam Adopsi Ekonomi Sirkular

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ABSTRACT

Fashion business is increasing concern on the circular economy implementation. This leads micro, small, and medium enterprises (MSMEs) to reflect on the economy, environmental, and social aspects that affect such implementation. This study aims to determine the implementation of circular economy principles in the fashion MSMEs located in Bandung City. Specifically, three objectives were investigated, i.e., identifying the categories of fashion MSMEs that adopt circular economy principles, estimating the remanufacturing sustainability indicator (RSI) value for fashion MSMEs that apply circular economy principles, and analyzing the factors that influence fashion MSMEs in applying circular economy principles. This study employed structural surveys of fashion MSMEs in Bandung City. The data were analyzed using descriptive analysis, remanufacturing sustainability indicator (RSI), and logistic regression. The results show that all types of MSMEs, based on their products, and based on PERMEN 11/Per/M.KUKM/XII/2015, have implemented circular economy principles. The RSI values range from 0.045 to 486,050,181 with an average of 48,605,102.81, indicating that the economic, social, and environmental remanufacturing indicators for fashion MSMEs exceed the national average. The influence factor for fashion MSMEs to implement circular economy principles only includes revenue variables. The output of this research provides a foundation for escalating government targets concerning the circular economy by 2030 and what needs to be prioritized, the level of sustainability remanufacturing in fashion MSMEs, the importance of the role of stakeholders in the initiation of a circular economy, and the implications of sustainability implementation regarding fashion MSME waste.

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ABSTRAK

Isu lingkungan global saat ini semakin mengukuhkan urgensi penerapan ekonomi sirkular. Hal ini mendorong Usaha Mikro, Kecil, dan Menengah (UMKM) untuk merenungkan aspek ekonomi, lingkungan, dan sosial yang memengaruhi implementasi tersebut. Penelitian ini bertujuan untuk menentukan penerapan prinsip ekonomi sirkular pada UMKM fesyen yang berlokasi di Kota Bandung. Secara khusus, tiga

tujuan diteliti, yaitu mengidentifikasi kategori UMKM fesyen yang mengadopsi prinsip ekonomi sirkular, memperkirakan nilai Indikator Keberlanjutan Remanufaktur (RSI) bagi UMKM fesyen yang menerapkan prinsip ekonomi sirkular, dan menganalisis faktor-faktor yang memengaruhi UMKM fesyen dalam menerapkan prinsip ekonomi sirkular. Penelitian ini menggunakan survei struktural terhadap UMKM fesyen di Kota Bandung. Data dianalisis dengan menggunakan analisis deskriptif, Indikator Keberlanjutan Remanufaktur (RSI), dan regresi logistik. Hasil penelitian menunjukkan semua jenis UMKM berdasarkan produk mereka, dan berdasarkan PERMEN 11/Per/M. KUKM/XII/2015 telah menerapkan prinsip ekonomi sirkular. Nilai-nilai RSI berkisar antara 0,045 hingga 486.050.181 dengan rata-rata 48.605.102,81 menunjukkan indikator-indikator remanufaktur ekonomi, sosial, dan lingkungan untuk UMKM fesyen melebihi rata-rata nasional. Faktor yang memengaruhi UMKM Fesyen dalam menerapkan prinsip ekonomi sirkular hanya meliputi variabel pendapatan. Output pada penelitian ini memberikan landasan untuk eskalasi target pemerintah perihal ekonomi sirkular di 2030 beserta hal yang perlu difokuskan, tingkat remanufaktur keberlanjutan UMKM Fesyen, pentingnya peran para stakeholder dalam inisiasi ekonomi sirkular dan implikasi penerapan keberlanjutan mengenai sampah UMKM Fesyen.

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Introduction

The current global environmental issues are emphasizing the urgency of implementing a circular economy. A circular economy is an economic system with a product lifecycle approach that primarily focuses on reducing, reusing, and repairing materials in the production, distribution, and consumption processes. This concept can be applied at the micro-level (companies and consumers), meso-level (eco-industrial areas), and macro-level (cities, regions, and countries) with the aim of achieving sustainable economics, fostering environmental quality, economic well-being, and social justice (Kirchherr et al., 2017). Currently, only nine percent of global economic activities embrace circular economy principles, while the linear growth-oriented economic system is closely associated with environmental issues such as deforestation, biodiversity loss, climate change, floods, and pollution (water, soil, and air) due to overexploitation and exceeding environmental carrying capacity in both input and output supply chains (WEF, 2019). The circular economy offers a solution and an antithesis to the problems posed by the linear economy (Korhonen et al., 2018).

Kuo et al. (2021) argues that the circular economy, as a concept used to describe a waste-free industrial economy, ultimately derives benefits from two types of material inputs: (1) biological materials that can return to nature without harming it, and (2) technical materials that can be continuously reused without posing harm or waste. Meanwhile, De Marchi (2020) defines sustainability as the ability to persist in the long term and simultaneously as a mechanism enabling the circular economy. Therefore, to establish an (automatic) circular economy mechanism, initiation from a certain party is required. The implementation of a circular economy will reduce the negative externalities from various industries that previously adhered to 'business as usual'. The textile industry plays a significant role in implementing the circular economy worldwide. Unfortunately, it's also one of the largest contributors to pollution after the oil industry (Carrico & Kim, 2014). Global data indicates that the fashion sector contributes 20% to global water waste (water pollution) and 20% of total global carbon emissions (air pollution) (UN 2021). Even fashion products that end up as solid waste contribute a staggering 92 million tons to landfills, accounting for 87% of total production and eventually being buried or incinerated (UNEP 2018). Given these substantial negative impacts, implementing a circular economy is an urgent necessity in the textile industry.

In Indonesia, the textile industry falls under one of the five pillars focused on implementing a circular economy whose implementation scheme is planned for 2030, which is predicted to contribute to a

2.5% increase in Indonesia's GDP, create 4.4 million job opportunities, and reduce fashion waste without further processing by 40% by 2030 (Bappenas 2021). According to BPS (2021), small and medium-sized enterprises (MSMEs) make up 99.90 percent of all operating businesses in Indonesia (totaling 63 million units), with the trade sector being the largest. MSMEs are the largest type of enterprise (contributing 60% to Indonesia's GDP) and serve as the foundation and support for Indonesia's economy (Christiana et al., 2014). The Coordinating Ministry for Maritime Affairs (2016) has designated Indonesia as needing to reach advanced country status, with entrepreneurs accounting for 14% of the population. BPS (2021) reports that the open unemployment rate in Indonesia is 5.86%.

This research makes a significant contribution to the understanding of business complexity at the micro level, particularly in the context of micro enterprises in Bontang Kuala. In line with the findings of Rosyadi et al. (2023), a focus on the development of inputs, processes, and outputs is key to revitalizing business growth, while challenges such as capital and human resources are also major issues faced. Utilizing the 'transfer of knowledge' approach, this study aims to identify solutions that can be applied by micro-business owners, making a tangible contribution to solving the challenges faced by similar business units.

According to Asriningtyas et al. (2019), flooding in Bandung City is not solely caused by natural factors such as high rainfall but also by human factors like land use changes and improper development. This indicates the need for serious attention and concrete actions from all parties to maintain and preserve the environment for sustainability. Based on the BPBD West Java report (2020), 142 neighborhoods from 30 districts experienced floods in the past three years, highlighting the need for other governmental bodies like DLHK to act.

Entrepreneurship plays a vital role in economic growth. According to Pranowo and Sihombing (2021), entrepreneurship can stimulate economic growth by generating new jobs, increasing income, and improving the well-being of society. According to GIS DUKCAPIL (2022), out of the total population of 2,452.9 thousand in Bandung City, 178,075 are employed in the private sector. This underscores the crucial role of MSMEs in entrepreneurship, serving as the backbone of a region's economy by contributing to economic growth and job opportunities. Wijaya et al. (2023) found that the quality of human resources and capital drives improvements in revenue, labor costs, market share, and profits. At one point, the length of business operations only stimulated revenue, labor costs, and market share but did not yield significant profits. However, an increase in revenue was also accompanied by an increase in labor costs, market share, and significant profits. According to Niu and Zhou (2022), the higher the revenue, the greater the opportunity for an SME to implement a circular economy.

According to Fauzi (2019), there are three sustainability aspects that bridge the conceptual definition towards the operational definition, namely artifacts, goal orientation, and interaction. Artifacts provide answers to "what" is considered a sustainable object or a concrete representation of the sustainable concept. Goal orientation is depicted as a starting point, which is a parameter determined as the basis for assessing whether an object or artifact is considered sustainable or not (the reference point in this goal orientation can be absolute or relative, although a pragmatic or relative approach is more commonly used, given its relative goals; although absolute goals are also important), it is crucial to understand the subjects, means, and factors influencing sustainability itself. The relative approach starts by identifying current conditions and problems that need to be addressed, and then gradual improvements are made to achieve sustainability. The relative measurement of sustainability is assessed based on the end result, whether it is better or worse than the ongoing conditions. The third aspect, interaction, involves whether the observed artifacts are static or dynamic. This aspect is based on the principle that artifacts (subjects) observed undergo changes due to external forces resulting from interactions with other systems and internal factors occurring within the observed system. In a static perspective, even though the analyzed object (artifact) is dynamic, external factors are considered static. This is a reference for the need for objectives 1, 2, and 3 in this research.

Based on the stated problem, the general objective of this research is to analyze the feasibility of a circular economy in fashion MSMEs in Bandung City. This can be achieved by addressing three specific objectives as follows.

1. Identify categories of fashion MSMEs that have adopted circular economy principles.
2. Estimate the remanufacturing sustainability indicators for fashion MSMEs implementing circular economy principles.
3. Analyze the factors influencing Fashion MSMEs in Bandung City to adopt circular economy principles.

Method

This research was conducted in the administrative area of Bandung and focused on MSMEs registered with the Bandung City Cooperative and SME Agency (DISKOPUMKM) using a random sampling method with 1450 MSMEs. The research spanned approximately three months, including three months for data collection (January-April 2023), which included thesis presentation and guidance processes.

Table I Matrix of Objectives, Data Types, and Data Sources

No	Objectives	Data types	Data Sources
1	Identify categories of Fashion MSMEs that have adopted circular economy principles	Descriptive analysis	Literature and primary data
2	Estimate the Remanufacturing Sustainability Indicators for Fashion MSMEs implementing circular economy principles	Quantitative data and comparative analysis using Remanufacturing Sustainability Indicator (RSI)	Primary data
3	Analyze the factors influencing Fashion MSMEs in Bandung City to adopt circular economy principles	Quantitative data and correlation analysis using logistic regression	Primary data

The method involved collecting primary data through surveys conducted among fashion MSMEs in Bandung City. The collected data were analyzed using descriptive analysis, remanufacturing sustainability indicator (RSI), and logistic regression. The parameter for MSMEs implementing a circular economy is defined as businesses engaging in at least one of the 5Rs (Reduce, Reuse, Recycle, Replace, and Replant) activities (EMF, 2015).

In Objective Number 2, the study used the RSI tool, which is an advancement of sustainability typologies by Pearce and Turner (1990) and Pezzoli (1997) on the 'Triple Bottom Line'. The RSI elements were derived from the work of Fatimah and Aman (2018), focused on Indonesian industries, and referencing international journals and literature on sustainability metrics in various developing countries. These RSI elements were compared to national averages to gauge the achievements of fashion MSMEs.

Table II Calculation Matrix of RSI Values

Indicator	Element	Measurement Unit	Equation
Economic Indicator	Job creation	% (Percentage)	$JC = \frac{total\ remanufacturing * jobs}{total\ formal\ jobs}$
	Salary Increase	IDR	$SI = \frac{incremental\ salary}{\text{total employee salary}}$
	Net Income	IDR	$NI = Pendapatan - total\ biaya$
	Production Costs	% (Percentage)	$PC = \frac{total\ \text{costs}}{total\ revenue}$

	Productivity	% (Percentage)	$P = \frac{total \text{ remanufacturing } input *}{total \text{ remanufacturing } output *}$
Social Indicator	Skilled workforce	% (Percentage)	$SW = \frac{total\ Skilled\ workforce}{total \text{ employees}}$
	Workplace Accident Rate	% (Percentage)	$WAR = \frac{total\ accidents}{total \text{ work hours}}$
	Labor productivity	% (Percentage)	$LP = \frac{total\ revenue}{total\ labor\ costs}$
	Community complaints	% (Percentage)	$CC = \frac{total\ customer\ complaints}{total\ customers}$
Environment Indicator	Material Acquisition	Kg	$MA = \frac{\text{Reused Material}}{\text{Total kg of remanufacturing} * \text{ products}}$

*remanufacturing= use of leftover production products (reuse/recycle)

The determination of independent variables in this research is based on previous studies: X1 Owner's age according to Dabija et al. (2019), X2 Business age according to Sabestova (2013), X3 Certified workers according to Pramadini et al. (2019), X4 Annual revenue according to Niu and Zhou (2022), and X5 Profit in implementing CE according to EMC (2016).

Also, for Objective 3, the estimation of the probability of a binary outcome (yes/no) event is done using logistic regression. In this research, logistic regression is employed to observe the relationship between the dependent variable Circular Economy Implementation (Y) and the independent variables: owner's age (X1), business age (X2), total certified workers (X3), annual MSME revenue (X4), and profit (X5). The following equation is used:

$$\mathrm{P}\,(\mathrm{Y}=1)=\frac{1}{1+\exp(-z)}, \quad (1)$$

$$Y = \beta 0 + \beta 1X1 + \beta 2X2 + \beta 3X3 + \beta 4X4 + \beta 5 * X5 \quad (2)$$

Table III Indicator and Label

Code	Specification	Source
P (Y=1):	P(Y = 1) represents the probability of implementing a circular economy (dependent variable Y) with a value of 1. This is the probability that event Y will occur, or that Y will have the value 1.	(1)
1/(1+exp(-Z))	A logistic function is used to convert Z values into probabilities. The logistic function produces a probability value between 0 and 1 (EXP = Exponential, Natural Logarithm).	(1)
β0	the intercept or constant term in the linear regression equation. It is the value of Z when all of the independent variables (X1, X2, X3, X4, and X5) are zero.	(2)
β1, β2, β3, β4, β5	The coefficients are associated with the respective independent variables. They indicate the strength and direction of the relationship between each independent variable (X1, X2, X3, X4, X5) and the dependent variable Z (or the outcome you're trying to predict). Positive coefficients (β) indicate a positive relationship, while negative coefficients indicate a negative relationship. The magnitude of these coefficients represents the change in Z associated with a one-unit change in the corresponding independent variable, holding all other variables constant.	(2)

X1, X2, X3, X4, X5:	The factors or variables that are being examined to see how they affect the dependent variable Z. Each X variable corresponds to a coefficient (β) that quantifies the relationship between that variable and the dependent variable Z.	(2)

Result and Discussion

The sample in this study encompasses all types of fashion production classifications according to Savitrie (2008), which include various categories of MSMEs producing clothing, pants, bags, shoes, and accessories, all of which apply circular economy principles, as well as based on Regulation of the Ministry of Cooperatives and MSMEs (PERMEN KUKM) number 11/Per/M.KUKM/XII/2015.

Classification and Characteristics of MSMEs Implementing Circular Economy Principles

In this research, there are small, micro, and medium-sized MSMEs that apply circular economy principles based on their revenue category. Out of 30 MSME samples, 22 have implemented circular economy principles, among which 20 continue the circular process with other parties, and two MSMEs manage the residual outputs of their production themselves.

Findings regarding the characteristics of MSMEs implementing the circular economy include: their revenue remained unaffected by the pandemic; no sampled MSME received credit related to the circular economy; the locations of these MSMEs are relatively remote and secluded; and the initiation of circular practices actually originated from employees seeking other opportunities. Two fashion MSMEs with a higher degree of circularity, specifically engaging in reusing within their own production cycles, share common aspects such as having the lowest revenue among their similar competitors, operating under the same legal entity, being located relatively close to the central government office in Bandung, being owned by males, and having owners younger than the average respondents.

Remanufacturing Sustainability Indicator of Fashion MSMEs

The remanufacturing sustainability indicator (RSI) of Fashion MSMEs Respondents who have implemented circular economy principles exhibit a low standard deviation in many elements. This indicates that the gap or difference in RSI values among the fashion MSMEs respondents is not too wide, although there is a relatively high standard deviation in certain indicators such as job creation, employee wage increase, and skilled workforce. This suggests that there is variation in RSI values among fashion MSMEs.

Table III The RSI Value of MSMEs Implementing Circular Economy Principles

Element	Indicator	Min Value	Max Value	Average	Standard Deviation
Economic Indicators					
Job Creation	Job Creation (%)	0	140	10	34
Employees	Salary Increase (%)	0	50	4	11
Process	Net Income (Rp.)	57.600.000	1.620.000.000	486.050.181	479.663.907
	Production Costs (%)	35	80	52	10
	Productivity (%)	0	50%	3%	11%
Social Indicators					
Employees	Workplace Accident Rate (%)	0	0,38	0.03	0.08
	Labor Productivity (%)	7	3008	770	661
	Skilled Workforce (%)	0	100	8	23
Community	Community Complaints(%)	0	0,4	0.06	0.13
Environment Indicators					
Material	Material Acquisition (%)	0	0.909	0.045	0,193

In terms of production processes, fashion MSMEs that apply circular economy principles achieve a net profit of an average of Rp. 486,050,181 while maintaining high levels of material acquisition and productivity. This demonstrates efficiency in resource utilization and production cost control.

Overall, the RSI results indicate that fashion MSMEs implementing circular economy principles have a positive impact on various aspects, including job creation, employee well-being, production efficiency, work quality, and environmental management. To support the growth and sustainability of MSMEs, it's crucial to continue promoting and developing the implementation of circular economy principles to provide broader benefits both for the MSMEs themselves and for the surrounding community and environment.

The achievement of economic-social-environmental indicators in the RSI value of fashion MSMEs respondents who have implemented circular economy principles is higher compared to those who are not implementing circular economy principles. For instance, the average value for the job creation indicator is 10%, while the maximum value reaches 140%. This demonstrates that fashion MSMEs have significant potential to increase job opportunities when applying circular economy principles (as only circular MSMEs have a weighted value in the job creation indicator). The 10% job creation rate among the fashion MSMEs respondents indicates that job creation in circular economy-oriented fashion MSMEs is five times higher than the average job creation rate among MSMEs in Indonesia. Although it is still below the average job creation rate in the manufacturing industry as a whole, an increase in the number of MSMEs will undoubtedly contribute significantly to job creation.

Table IV Comparison of the Average Value of the RSI Elements in the Sample MSMEs with Standards in Indonesia

Indikator	National Average Standard (per year)	The Average Value of the MSME Elements of Respondents at the RSI against National Standards
Job creation in Indonesia	2 %	✓ 5x Higher
Job creation for the manufacturing industry	18.63% (1,14 million vacancies)	X $\frac{18}{10}$ x Lower
Increase in salary for MSME employees	3 %	X $\frac{4}{3}$ x Higher
Provincial minimum wage, West Java	Rp. 23.400.040	✓ $\frac{247}{234}$ x Higher
Net profit of micro business	Rp. 76 million	✓ $\frac{486}{76}$ x Higher
Net profit of small business	Rp. 1,63 billion	X $\frac{1630}{486}$ x Higher
Work accident rate	0.3 %	✓ $\frac{38}{30}$ Lower (but better)
Small business productivity	50 %	✓ $\frac{770}{150}$ Higher
Medium business productivity	150 %	✓ $\frac{770}{250}$ Higher
Certified workers rate	3,5 %	✓ $\frac{8}{3}$ x Higher

Sources: BI (2015), BPS (2021), BPS (2020), KEMNAKER (2020), dan MENKOPUKM (2020)

The implications of the table indicate that the average RSI values of the MSME respondents are consistently above the national standards across various indicators. First, the higher job creation rate in Indonesia compared to the national average demonstrates the positive impact of MSMEs in generating employment opportunities. Additionally, the higher job creation rate in the manufacturing industry

exceeding the national average highlights the role of MSMEs in contributing to industrial growth and workforce absorption. Moreover, the MSME respondents achieve higher wage increases than both the provincial and national minimum wages. The low incidence of workplace accidents, as indicated by the low accident rate, reflects the prioritization of safety measures by the surveyed MSMEs. The higher level of productivity among small and medium-sized businesses surpassing the national average signifies efficient resource utilization and effective business operations. These implications indicate that the surveyed MSMEs have demonstrated commendable performance in various aspects, contributing positively to job creation, wage growth, profitability, safety, productivity, and professional development.

Overall, the implications of the comparative results suggest that the MSME respondents exhibit strong performance and have exceeded national standards in various aspects. This underscores the potential and contribution of MSMEs in supporting economic growth, job creation, employee welfare improvement, increased productivity, and workplace safety. Efforts are needed to support and expand the development of MSMEs to strengthen the micro, small, and medium-sized business sector in Indonesia.

Factors Influencing Fashion MSMEs in Applying Circular Economy Principles

In the initial testing phase (Block 0), a model sig. value of 0.000 was obtained. Since the sig. value is less than 5% = 0.05, we reject the null hypothesis (H0) at a significance level of 5%. This leads to the conclusion that the independent variables used collectively influence the implementation of the circular economy by SME actors. This indicates that the addition of independent variables can significantly impact the model, or, in other words, the model is considered to be a good fit.

The selection of independent variables in this research is based on previous studies: X1 age of owner according to Dabija et al. (2019), X2 age of business according to Sabestova (2013), X3 certified employees according to Pramadini et al. (2019), X4 revenue according to Niu and Zhou (2022), and X5 profit in implementing sustainable enterprises (SE) according to EMC (2016), where these variables have been proven to influence owner perceptions for implementing sustainability principles. In this study, estimation of these variables was conducted using partial logistic regression and through tests such as Log Likelihood, Cox & Snell R Square, Nagelkerke R Square, and the Chi-Square Hosmer and Lemeshow test.

Tabel V Variables in the Equation

							Exp(B)	95% C.I. for EXP(B)	
		B	S.E.	Wald	df	Sig.	Lower	Upper	
Step 1[a]	OWNER_AGE	.126	.143	.777	1	.378	1.134	.857	1.501
	SME_AGE	.252	.231	1.196	1	.274	1.287	.819	2.022
	CERTIFIED_WORKERS	-3.778	1578.006	.000	1	.998	.023	.000	.
	ANNUAL_INCOME,	.0…251	.0…112	4.626	1	.031	1.0.0251	1.000	1.000
	CIRCULAR_PROFIT	.0002	.003	.000	1	1.000	1.000	.994	1.006
	Constant	-12.996	8.698	2.233	1	.135	.000		

a. Variable(s) entered on step 1: OWNER_AGE, SME_AGE, CERTIFIED_WORKERS, ANNUAL_INCOME, CIRCULAR_PROFIT

Table V is the result of data analysis using logistic regression. The age of MSME owners, the age of MSMEs, certified employees, and circular economy profit all have a P value Sig Wald > 0.05, which leads to rejecting H1, meaning that these variables do not provide a significant partial influence on circular economy implementation. On the other hand, the variable 'annual revenue' has a Sig Wald value < 0.05, leading to accepting H1, meaning that the 'annual revenue' variable significantly contributes to the partial implementation of circular economy principles.

The probability of the occurrence of an event in the dependent variable can be calculated using the equation $\pi 1 = \frac{1}{1+\exp(-z)}$, , with the value of z based on the independent variable and its coefficient. Exp(B) = e^B, so when Exp(B) increases by 10 million Indonesian Rupiah, $e^{0,2605 \times 10^{-7} \text{ x } 10.000.000}$ 10,000,000) ≈ 1.298. The odds ratio can be interpreted as an increase in revenue of Rp 10,000,000, indicating that the likelihood of fashion MSMEs adopting a circular economy increases by 29.8% compared to before. This underscores the importance of revenue growth for the adoption of circular economy principles in fashion MSMEs, where the benefits from economic, social, and environmental aspects can be felt by stakeholders. Therefore, it is crucial for stakeholders to encourage revenue growth in fashion MSMEs. This supports the statement by Niu and Zhou (2022) on the importance of revenue for MSMEs to adopt sustainability principles. If sustainability principles contribute tangible transactions to the business, owners are more likely to implement these principles. Only the revenue factor influences the use of circular economy principles by fashion MSMEs. Hence, further investigation is needed, incorporating other factors besides those mentioned above, to determine additional actions to encourage fashion MSMEs to be more active in implementing circular economy principles and optimizing the potential benefits from such implementation.

Conclusion

According to Savitrie (2008) and Minister of Cooperatives and Small and Medium Enterprises (KUKM) Regulation number 11/Per/M.KUKM/XII/2015, all classifications of fashion MSMEs samples, including those involved in the production of clothing, pants, bags, shoes, accessories, micro, small, and medium-sized enterprises, have implemented circular economy principles. While this indicates the feasibility of implementing a circular economy in fashion MSMEs, the absence of a circular economic mechanism suggests that the fashion sector is still far from the government's target for 2030.

The RSI (Resilience, Sustainability, and Inclusivity) values of Fashion MSMEs applying circular economy principles indicate that those adhering to RSI have contributed to economic, social, and environmental indicators. The RSI values demonstrate the circular application, benefiting not only the business entities but also the surrounding stakeholders. The RSI indicators of MSMEs implementing Circular Economy have surpassed the national average.

The variable influencing fashion MSMEs to adopt circular economy principles is revenue. Based on the odds ratio of revenue, it can be interpreted that with an increase of Rp 10,000,000, the likelihood of fashion MSMEs implementing circular economy principles increases by approximately 29.8% compared to before. This reinforces previous literature and the background of the study, where revenue is a significant factor influencing business owners' perceptions of adopting sustainability principles.

Based on the conclusions above, this research formulates four recommendations as follows.

1. Government Focus on Circular Economy Mechanisms
   The government, through the Department of Environment and Cleanliness, needs to focus on regulations or policies that facilitate circular economy mechanisms in fashion MSMEs. This includes circular collaboration and exchange, training, and mentoring, as well as the provision of fashion industry zones. These initiatives aim to strengthen sustainable ecosystems and promote the development of MSMEs adopting circular economic principles, bringing them closer to the Government's targets for Sustainable Development in 2030. Given that many types of MSMEs have already implemented circular economy practices, further utilization and initiation from stakeholders are crucial to creating circular economic mechanisms and ecosystems.
2. Sustain Remanufacturing Practices
   All stakeholders in fashion MSMEs need to maintain sustainable remanufacturing practices that have proven to be highly effective in economic, social, and environmental aspects compared to the

national average. Additionally, all stakeholders, including the local community and the government through the Department of Environment and Cleanliness in the city of Bandung, can assist through waste separation, supporting the sustainability of MSMEs implementing sustainable principles. Furthermore, for further research, RSI values can be used to determine the level of remanufacturing sustainability or as a reference point.

3. Stakeholder Support for Revenue Enhancement
   Stakeholders, including the government through the Department of Cooperatives and MSMEs, and financial providers, need to encourage MSMEs to increase their revenue. This can be achieved through education, certification, and circular economy-focused credit to enhance circularity. The objective is to strengthen the sustainability of businesses and provide greater social and environmental benefits.

4. Advanced Research and Utilization of RSI Values
   For future research, RSI values can be used as a benchmark for determining the sustainability level of remanufacturing or as an alternative reference besides the national average standard. This can aid in measuring the effectiveness and impact of sustainability practices implemented by fashion MSMEs adopting circular economic principles.

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