

DRIVING SUSTAINABLE PERFORMANCE AMONG MICRO-ENTREPRENEURS: THE INTERPLAY OF MENTAL MODEL DISRUPTION, ENTREPRENEURIAL KNOWLEDGE AND FRUGAL INNOVATION

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Abstract: This study investigates the factors driving frugal innovation and its impact on sustainable performance in fashion micro-entrepreneurs in Indonesia. It examines how mental model disruption and entrepreneurial knowledge drive frugal innovation, with the business ecosystem moderating the relationship. It also evaluates how frugal innovation directly affects sustainable performance. Data were collected from 340 micro-entrepreneurs through structured questionnaires and analyzed using SmartPLS. The findings reveal that mental model disruption significantly enhances frugal innovation, entrepreneurs who can challenge and transform existing mindsets are better equipped to develop cost-effective and resource-efficient innovations. Entrepreneurial knowledge also has a significant positive effect on frugal innovation, indicating that a deep understanding of market dynamics and resource utilization strengthens the capacity to develop innovative solutions that are both economical and effective. The study also confirms that the business ecosystem significantly moderates the relationship between mental model disruption and frugal innovation. Finally, frugal innovation has a significant positive impact on sustainable performance in achieving economic efficiency, social inclusivity, and environmental sustainability.

Keywords: sustainable performance, frugal innovation, mental model disruption, entrepreneurial knowledge, business ecosystem

Introduction

In the era of globalization characterized by rapid market dynamics and intense competition, innovation is a key element for business continuity and success. For resource-constrained micro businesses, frugal innovation offers a strategy to develop low-cost, high-value

products or services through creative use of technology and business processes to improve efficiency and effectiveness (Radjou & Prabhu, 2015; Dabic, 2021; Tsou, 2018).

Psychological factors also play an important role in innovation. Factors such as self-efficacy, resilience, and an

entrepreneurial mindset influence how individuals respond to challenges and opportunities in a dynamic business environment (Bandura, 1997). Self-efficacy, or confidence in one's ability to achieve a specific goal, has been shown to positively correlate with innovative behavior (Krueger & Day, 2010). Resilience allows individuals to recover from failure and keep trying new ideas, while an entrepreneurial mindset encourages risk-taking and the exploration of new opportunities.

Beyond the psychological aspect, entrepreneurial knowledge is also a key factor affecting frugal innovation. Entrepreneurial knowledge includes an understanding of markets, technologies, and business strategies that enable micro-entrepreneurs to identify and capitalize on innovation opportunities (Shane, 2000; Dabic, 2021; Qin, 2024). This knowledge allows entrepreneurs to combine limited resources efficiently and create innovative solutions that fit market needs. One important element in encouraging frugal innovation is disrupting mental models (mental model disruption).

No research on frugal innovation has examined how mental models shape sustainable performance. A mental model is a framework that individuals or organizations use to understand and interact with the world around them. Disruption of mental models refers to the ability to overhaul established mindsets and perspectives, paving the way for new thinking and innovation (Senge, 2006; Le & Lei, 2020). Research shows that mental model disorders can increase creativity and innovation by allowing individuals to see problems and solutions from different perspectives (Hossain, 2021). Furthermore, frugal innovation has significant implications for sustainable performance. Sustainable performance includes

economic, social, and environmental aspects, all of which frugal innovation can improve (Bocken et al., 2014; Tsou, 2018). Frugal innovation helps micro-businesses to reduce production costs, improve operational efficiency, and create more environmentally friendly products, thereby contributing to overall sustainable performance.

In this study, the business ecosystem is used as a moderator variable that strengthens the relationship between mental model disruption and frugal innovation. The business ecosystem includes a network of interactions and relationships between various stakeholders in the business environment, including suppliers, distributors, customers, the industrial community, and governments (Moore, 1996). A strong business ecosystem can provide the support, resources, and information necessary to drive frugal innovation (Isenberg, 2010).

In Indonesia, especially in the fashion industry, this business ecosystem is crucial for helping micro businesses adapt and thrive amid ever-changing market challenges. This study aims to analyze the influence of the mental disruption model, psychological aspects, and entrepreneurial knowledge on frugal innovation and its implications for sustainable performance.

In addition, this study also aims to explore the role of business ecosystem moderation in the relationship between mental model disruption and frugal innovation. Thus, this research is expected to contribute significantly to understanding the factors that drive frugal innovation and sustainable performance in micro-enterprises in Indonesia's fashion sector.

This study offers four theoretical contributions. First, whereas prior research has explained FI mainly through

resource scarcity, institutional voids, and organizational capabilities in larger firms (Zeschky et al., 2011; Hossain, 2021), it proposes mental model disruption as a cognitive, individual-level antecedent that enables micro-entrepreneurs to reframe resource constraints as opportunities. Second, it integrates cognitive and knowledge-based factors within a single model, which prior studies have examined separately (Qin, 2024). Third, it positions the business ecosystem as a moderating condition, highlighting when cognitive change translates into innovation rather than treating the ecosystem as a direct driver. Finally, it extends the FI–SP relationship from its largely conceptual basis to the context of fashion micro-enterprises in an emerging economy.

CONCEPTUAL FRAMEWORK

Metal Model Disruption and Frugal Innovation

The disruption mental model is a change in how individuals or organizations think that enables innovation (Senge, 2006). A mental model is the cognitive framework people use to understand and interact with the world. When an existing mental model is disrupted, individuals can see problems from a new perspective and find creative solutions (Le & Lei, 2020; Hossain, 2021). Research by Le & Lei (2020) shows that mental model disorders can increase an individual's capacity to innovate by changing the way they perceive challenges and opportunities. Hossain (2021) also emphasized that a disruption-oriented mentality is important for innovation because it allows entrepreneurs to think outside conventional boundaries and create new value.

Psychological Aspects

Psychological factors, including self-efficacy, resilience, and entrepreneurial mindset, play an important role in innovation, with self-efficacy positively associated with innovative behavior (Bandura, 1997; Krueger & Day, 2010). Resilience, the ability to recover from failure, allows individuals to continue trying new ideas despite facing obstacles (Bandura, 1997). An entrepreneurial mindset encourages risk-taking and the exploration of new opportunities, which is at the core of frugal innovation (Dweck, 2006).

Entrepreneurial Knowledge

Entrepreneurial knowledge of markets, technologies, and business strategies helps entrepreneurs identify innovation opportunities and develop cost-effective, high-value solutions through frugal innovation (Shane, 2000; Dabic, 2021).. Qin (2024) also shows that entrepreneurial knowledge improves innovation performance by enabling entrepreneurs to adapt to changing environmental dynamics.

Frugal Innovation

Frugal innovation is the process of creating a cost-effective but high-value product or service, often using limited resources (Radjou & Prabhu, 2015; Dabic, 2021). Frugal innovation is highly relevant for micro businesses that must operate on a limited budget while still competing in a competitive market (Tsou, 2018). According to Radjou and Prabhu (2015), frugal innovation involves cost savings through simple product design, operational efficiency, and reusing existing resources.

For micro-entrepreneurs operating under resource constraints, a disrupted mental model is precisely what is needed to reframe limitations as opportunities and to develop low-cost, high-value solutions, which lie at the core of frugal innovation. Entrepreneurs with richer market and technological knowledge are therefore better positioned to recognize which features customers truly value, which costs can be eliminated, and which existing resources can be recombined.

H1: Mental model disruption has a positive effect on frugal innovation

H2: Entrepreneurial knowledge has a positive effect on frugal innovation

The Moderating Role of Business Ecosystem

The business ecosystem includes a network of interactions and relationships between various stakeholders in the business environment, including suppliers, distributors, customers, the industrial community, and governments (Moore, 1996). A strong business ecosystem can provide the support, resources, and information necessary to drive frugal innovation (Isenberg, 2010). Moore (1996) argues that business ecosystems play an important role in creating an environment that supports innovation by providing access to knowledge, technology, and markets. This study aims to analyze how the business ecosystem can strengthen the relationship between mental model disruption and frugal innovation. By understanding the business ecosystem's role, micro-enterprises can optimize their innovation strategies to achieve sustainable performance.

This study examines how a robust business ecosystem can enhance the relationship between mental model disruption and frugal innovation, helping micro-enterprises optimize their

innovation strategies to achieve sustainable performance.

H3: The business ecosystem moderates the relationship between mental model disruption and frugal innovation

Frugal Innovation and Sustainable Performance

sustainable includes the economic, social, and environmental aspects of business operations (Bocken et al., 2014). Frugal innovation can improve sustainable performance by reducing production costs, improving operational efficiency, and producing more environmentally friendly products (Tsou, 2018). Tsou (2018) emphasizes that frugal innovations can significantly contribute to sustainable performance by enabling more efficient resource use and reducing environmental impact.

H4: Frugal innovation has a positive effect on sustainable performance

This study's theoretical framework is grounded in the interplay among mental model disruption, entrepreneurial knowledge, frugal innovation, sustainable performance, and the business ecosystem. Mental model disruption, as described by Senge (2006), facilitates innovation by altering cognitive frameworks, enabling individuals to perceive challenges and opportunities differently (Le & Lei, 2020; Hossain, 2021). Entrepreneurial knowledge, encompassing market, technological, and strategic insights, is crucial for identifying and exploiting innovation opportunities (Shane, 2000; Dabic, 2021; Qin, 2024). Frugal innovation, the process of creating cost-effective yet high-value products or services with limited resources, is vital for micro businesses to remain competitive (Radjou & Prabhu, 2015; Dabic, 2021; Tsou, 2018). Sustainable performance integrates

economic, social, and environmental considerations, with frugal innovation contributing through cost reduction, operational efficiency, and environmental friendliness (Bocken et al., 2014; Tsou, 2018). The business ecosystem, comprising networks of stakeholders such as suppliers, distributors, and customers, provides the support, resources, and information needed to foster innovation (Moore, 1996; Isenberg, 2010).

The model is tested on fashion micro-enterprises in Indonesia to understand how these firms can optimize their innovation strategies to achieve sustainable performance. The research framework is presented in Figure 1.

The number of samples in this study was determined based on the recommendation of Hair et al. (2010), which suggested a minimum sample size of 5-10 times the number of variables to be analyzed. In this study, there are 34 indicators, so the required sample size is between 170 and 340. To improve the reliability of the research results, the study used a sample of 340 micro-enterprises in Indonesia's fashion sector. The data were collected using a questionnaire distributed to micro-business owners or managers in the fashion sector.

Data were collected through a structured questionnaire distributed online via Google Forms. Respondents were reached through fashion MSMEs

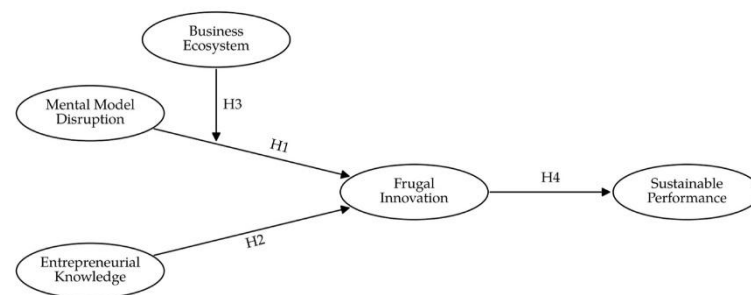


Figure 1. Research Framework

RESEARCH METHODOLOGY

This study uses a quantitative approach to examine the influence of the mental disruption model, psychological aspects, and entrepreneurial knowledge on frugal innovation and its implications on sustainable performance. In addition, this study also explores the role of the business ecosystem as a moderator in the relationship between the disruption model mentality and frugal innovation. The sample was selected using purposive random sampling. This technique was chosen to ensure the sample comprises micro-enterprises active in the fashion sector that have the potential to innovate frugally and contribute to sustainable performance.

associations and communities.

The questionnaire used a 5-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree), to measure respondents' perceptions of each statement.

This study addresses ethical considerations by ensuring respondents' confidentiality and privacy. Participation in the study was voluntary, and respondents received clear information about the study's purpose and their right to withdraw at any time without consequences. The data obtained from the questionnaire were then analyzed using SmartPLS (Partial Least Squares Structural Equation Modeling). SmartPLS was chosen because of its ability to handle

complex models and data that are not normally distributed.

Table 1. Measurement Items

Code	Indicator	Source
Mental Model Disruption		
MMD1	I frequently question the basic assumptions in my business.	Le & Lei (2020); Hossain (2021)
MMD2	I am open to new ideas and different ways of thinking.	Le & Lei (2020); Hossain (2021)
MMD3	I encourage changes in thinking patterns within my team.	Le & Lei (2020); Hossain (2021)
MMD4	I often try new approaches to solve problems.	Le & Lei (2020); Hossain (2021)
MMD5	I am confident in my ability to achieve my business goals.	Bandura (1997)
MMD6	I am sure I can overcome challenges in my business.	Bandura (1997)
MMD7	I feel capable of making good business decisions.	Bandura (1997)
MMD8	I can bounce back after facing failures in my business.	Wagnild & Young (1993)
MMD9	I remain motivated despite facing difficulties.	Wagnild & Young (1993)
MMD10	I can adapt to changes in my business.	Wagnild & Young (1993)
Entrepreneurial Knowledge		
EK1	I always look for new opportunities in my business.	Dweck (2006)
EK2	I am willing to take risks for greater rewards.	Dweck (2006)
EK3	I continuously look for ways to improve my business.	Dweck (2006)
EK4	I have good knowledge of the market I operate in.	Shane (2000); Dabic (2021); Qin (2024)
EK5	I understand the technologies relevant to my business.	Shane (2000); Dabic (2021); Qin (2024)
EK6	I know how to develop effective business strategies.	Shane (2000); Dabic (2021); Qin (2024)
EK7	I have knowledge about financial management.	Shane (2000); Dabic (2021); Qin (2024)
Frugal Innovation		
FI1	I often use limited resources to create new value.	Radjou & Prabhu (2015); Dabic (2021); Tsou (2018)
FI2	I produce cost-effective products or services.	Radjou & Prabhu (2015); Dabic (2021); Tsou (2018)
FI3	I continuously look for ways to reduce costs without compromising quality.	Radjou & Prabhu (2015); Dabic (2021); Tsou (2018)
FI4	I use simple technologies to enhance efficiency.	Radjou & Prabhu (2015); Dabic (2021); Tsou (2018)
Sustainable Performance		
SP1	My business achieves the desired financial targets.	Bocken et al. (2014)
SP2	My business experiences increased profitability.	Bocken et al. (2014)
SP3	I can control the operational costs of my business.	Bocken et al. (2014)
SP4	My business creates positive impacts on the surrounding community.	Bocken et al. (2014)
SP5	I pay attention to the well-being of employees in my business.	Bocken et al. (2014)

Code	Indicator	Source
SP6	My business is involved in beneficial social activities.	Bocken et al. (2014)
SP7	My business reduces negative impacts on the environment.	Bocken et al. (2014)
SP8	I use environmentally friendly materials.	Bocken et al. (2014); Tsou (2018)
SP9	My business complies with environmental regulations.	Bocken et al. (2014); Tsou (2018)
Business Ecosystem		
BE1	I receive support from my business network.	Moore (1996); Isenberg (2010)
BE2	I have access to necessary resources through my business ecosystem.	Moore (1996); Isenberg (2010)
BE3	I gain useful information from my business community.	Moore (1996); Isenberg (2010)
BE4	My business ecosystem helps in overcoming business challenges.	Moore (1996); Isenberg (2010)

Source: Compiled by the authors from the literature.

RESULT AND DISCUSSION

Respondents Profile

Table 2 presents the profile of 340 respondents, all of whom are owners or managers of fashion micro-entreprises. The majority of respondents were female (61.2%), while males accounted for 38.8%. More than half of the respondents were young entrepreneurs under 34 years of age. Regarding education, nearly half of the respondents had completed senior or vocational high school. Geographically, respondents were spread across 43 cities in Indonesia, with the largest proportion located in Java (44.1%). This profile suggests that the sample is dominated by young, female entrepreneurs with secondary-level education, reflecting the general characteristics of fashion micro-enterprises in Indonesia.

Table 2. Respondents Profile

Characteristic	n	%
Gender		
Male	132	38.8
Female	208	61.2
Age (years)		
18-25	104	30.6
26-33	77	22.6
34-41	46	13.5
42-49	67	19.7
> 50	46	13.5

Characteristic	n	%
Education		
Elementary school	19	5.6
Junior high school	28	8.2
Senior/vocational high school	165	48.5
Diploma	29	8.5
Bachelor's degree or higher	99	29.1
Region		
Sumatra	94	27.6
Java	150	44.1
Bali and Nusa Tenggara	29	8.5
Kalimantan	19	5.6
Sulawesi	25	7.4
Maluku and Papua	23	6.8

Convergent Validity Test

Convergent validity refers to the extent to which the indicators of a construct converge, that is, share a high proportion of variance in measuring the same concept. Following Hair et al. (2010), convergent validity was assessed using outer loadings and Average Variance Extracted (AVE). AVE measures the variance a latent variable captures from its indicators relative to the variance due to measurement error. It is used to assess convergent validity, with values above 0.50 indicating that the construct explains more than half of the variance in its indicators (Fornell & Larcker, 1981).

Table 3. Validity Test Results

Variable	Indicator	Outer Loading	AVE	Remark
Mental Model Disruption	MMD1	0.874	0.660	Valid
	MMD2	0.700		Valid
	MMD3	0.891		Valid
	MMD4	0.762		Valid
	MMD5	0.798		Valid
	MMD6	0.801		Valid
	MMD7	0.800		Valid
	MMD8	0.814		Valid
	MMD9	0.855		Valid
	MMD10	0.814		Valid
Entrepreneurial Knowledge	EK1	0.705	0.644	Valid
	EK2	0.871		Valid
	EK3	0.800		Valid
	EK4	0.714		Valid
	EK5	0.898		Valid
	EK6	0.811		Valid
	EK7	0.799		Valid
Frugal Innovation	FI1	0.904	0.819	Valid
	FI2	0.899		Valid
	FI3	0.841		Valid
	FI4	0.971		Valid
Sustainable Performance	SP1	0.833	0.745	Valid
	SP2	0.860		Valid
	SP3	0.881		Valid
	SP4	0.790		Valid
	SP5	0.841		Valid
	SP6	0.873		Valid
	SP7	0.888		Valid
	SP8	0.890		Valid
	SP9	0.905		Valid
Business Ecosystem	BE1	0.815	0.731	Valid
	BE2	0.891		Valid
	BE3	0.871		Valid
	BE4	0.840		Valid

Construct Reliability

Cronbach's alpha measures internal consistency reliability, indicating how well a set of items measures a single unidimensional latent construct. It ranges from 0 to 1, with higher values indicating greater reliability. Values above 0.70 are generally considered acceptable (Cronbach, 1951). Reliability refers to the consistency and stability of a measurement instrument. It indicates the extent to which the instrument produces consistent results over repeated measurements. High reliability suggests that the measurement instrument is free from random error (Nunnally, 1978).

Table 4. Reliability Test results

Variable	Cronbach's Alpha	Composite Reliability	Remark
Mental Model Disruption (MMD)	0.925	0.951	Reliable
Entrepreneurial Knowledge (EK)	0.913	0.926	Reliable
Frugal Innovation (FI)	0.895	0.947	Reliable
Sustainable Performance (SP)	0.937	0.963	Reliable
Business Ecosystem (BE)	0.873	0.916	Reliable

Table 5. Heterotrait-Monotrait Ratio (HTMT)

	MMD	EK	BE	FI	SP
MMD					
EK	0.819				
BE	0.889	0.889			
FI	0.783	0.839	0.842		
SP	0.880	0.810	0.860	0.887	

Note: Discriminant validity is established when HTMT < 0.9.

HTMT results show that discriminant validity is below the 0.90 threshold, establishing robust discriminant validity across all latent constructs.

Table 6. Coefficient of Determination (R²)

Construct	R ²	Adj. R ²	p-value	Remark
Frugal Innovation	0.812	0.804	< 0.001	Substantial
Sustainable Performance	0.777	0.775	< 0.001	Substantial

Note: R² values of 0.25, 0.50, and 0.75 indicate weak, moderate, and substantial explanatory power.

The structural model shows strong predictive power, explaining 81.2% of the variance in FI and 77% of the variance in SP. Overall, these findings validate the empirical distinctiveness of the variables and confirm that the model provides a highly rigorous framework for hypothesis testing.

Hypothesis Testing

The test results include a direct effect. The sign indicates the direction of influence between

one variable on another variable. Here are the results of the hypothesis testing.

Tabel 5. Hypothesis Testing Results

H	Path	β	p-value	Decision
H1	Mental Model Disruption → Frugal Innovation	0.788	0.001	Supported
H2	Entrepreneurial Knowledge → Frugal Innovation	0.659	0.003	Supported
H3	Business Ecosystem × Mental Model Disruption → Frugal Innovation	0.786	0.001	Supported
H4	Frugal Innovation → Sustainable Performance	0.897	< 0.001	Supported

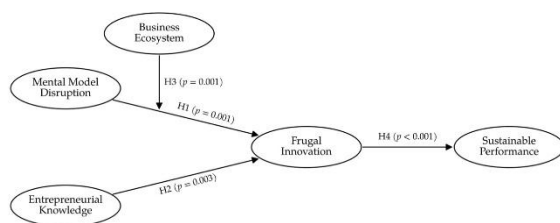


Figure 2. Research Results

Mental Model Disruption on Frugal Innovation

Mental model disruption is the process by which individuals or organizations overhaul established mindsets and assumptions to see problems from a new perspective and find innovative solutions (Senge, 2006; Le & Lei, 2020). The results show that the influence of the disruption model mentality on frugal innovation has a p-value of $0.001 < 0.05$. This means that the higher the mental disruption model is owned by the entrepreneur, the higher the frugal innovation. In the context of micro-businesses in the fashion sector in Indonesia, mental model disruption can play an important role in encouraging frugal innovation. Afuah (2014) explains that by overhauling existing mental models, microbusiness owners and managers in the fashion sector can develop creative ways to overcome resource limitations. They can find new ways to use existing materials, redesign products to be more cost-effective, and leverage simple technologies to improve efficiency.

In addition, the mental disruption model helps businesses stay flexible and responsive to market changes. In the fashion industry, where consumer trends and preferences change rapidly, the ability to change business mindsets and strategies is essential to stay competitive (Mezias & Glynn, 1993). Rao (2013) also explained that micro-businesses that adopt a mental disruption model and implement frugal innovation tend to be more competitive. They can offer quality products at more affordable prices, thus attracting more consumers. Frugal innovation driven by a disruption-model mentality also contributes to business sustainability. By reducing waste and utilizing resources efficiently, businesses not only save costs but also reduce their environmental impact (Zeschky, Winterhalter, & Gassmann, 2014). A disruption-model mentality can facilitate collaboration and integration within the business ecosystem. Microbusinesses that think innovatively tend to seek and benefit from the support of their business networks, including suppliers, distributors, and industry communities, which in turn strengthens the overall business ecosystem (Adner, 2006; Iansiti & Levien, 2004).

Entrepreneur Knowledge on Frugal Innovation

The results show that entrepreneurial knowledge has a significant positive influence on frugal innovation ($p = 0.003 < 0.05$).

Entrepreneurial knowledge includes a deep understanding of the market, including consumer needs and preferences. This knowledge helps entrepreneurs identify untapped opportunities and develop products or services that meet those needs at low cost. For example, knowledge of low-income market segments can encourage entrepreneurs to create innovative solutions that are affordable and relevant to this group (Shane, 2000; Radjou & Prabhu, 2015).

With strong entrepreneurial knowledge, entrepreneurs can use limited resources more efficiently. They can find ways to maximize output with minimal input, which is at the heart of frugal innovation. Examples include using cheap but quality raw materials or simple technologies that remain effective (Bhatti & Ventresca, 2013). Afuah (2014) explained that entrepreneurial knowledge

increases entrepreneurs' capacity to think creatively and find innovative solutions. Entrepreneurs who understand industry dynamics and the latest technologies are better able to create new products or services that are not only cost-effective but also innovative.

Entrepreneurial knowledge also helps entrepreneurs adapt and respond to changes in the market and technology. In a dynamic business environment, adapting quickly is key to staying competitive. Knowledgeable entrepreneurs can quickly adapt their strategies to capitalize on new opportunities or address emerging challenges (Qin, 2024). Entrepreneurs with strong knowledge can implement frugal innovation more effectively, which in turn increases their business's competitiveness. They can offer quality products at more affordable prices, attract more customers and increase their market share (Zeschky, Winterhalter, & Gassmann, 2014).

Business Ecosystem as Moderator Mental Model Disruption and Frugal Innovation

A business ecosystem is a network of organizations, including suppliers, distributors, customers, competitors, governments, and other communities, involved in providing products and services through cooperation and competition (Moore, 1996). This ecosystem creates a dynamic environment where companies can support each other to innovate and grow.

The results of this study show that the business ecosystem strengthens the relationship between disruption model mentality and frugal innovation, with a *p*-value of 0.001. The business ecosystem provides access to a wide range of resources that may not be accessible to individual companies. These resources include knowledge, technology, raw materials, and finance. In the context of the disruption model mentality, the business ecosystem can help companies implement new, cost-effective ideas more effectively. With these additional resources, companies can develop frugal

innovation faster and more efficiently (Adner, 2006; Iansiti & Levien, 2004).

Nambisan & Sawhney (2011) explained that the business ecosystem can improve companies' innovation capabilities by providing a platform for collaboration and knowledge sharing. Interaction with various actors in the ecosystem allows companies to gain new insights and creative ideas that can be applied in frugal innovation. This collaboration can accelerate the mental process of the disruption model and help companies to adopt innovative approaches that are more cost-effective

The business ecosystem, as a moderator, helps companies implement the disruption-model mentality more effectively and develop frugal innovation. This increases the company's ability to innovate at low cost while still providing high value (Adner, 2006). With support from the business ecosystem, companies can achieve greater sustainability in their innovations. This includes not only economic aspects but also social and environmental aspects, as business ecosystems often also support sustainability initiatives (Zeschky, Winterhalter, & Gassmann, 2014). Iansiti & Levien (2004) also explained that companies operating in a supportive business ecosystem are more competitive in the market. They have access to better resources, higher innovation capabilities, and strong institutional support, all of which contribute to increased competitiveness

Frugal Innovation on Sustainable Performance

The results show that frugal innovation and sustainable performance have a significant positive relationship (*p*-value = 0.000). Frugal innovation is the process of creating a product or service that is cost-effective but still provides high value. It focuses on efficiency, cost

reduction, and reduced resource use while still meeting market needs (Radjou & Prabhu, 2015).

Elkington (1997) explained that sustainable performance includes three main dimensions: economic, social, and environmental. Sustainable performance means achieving economic goals while minimizing negative environmental impacts and making a positive contribution to society. Frugal innovation helps companies reduce production costs by using cheaper technology, more affordable raw materials, and more efficient production processes. By reducing costs, companies can increase profit margins and market competitiveness (Bhatti & Ventresca, 2013). In addition, Frugal innovation allows companies to create more affordable products for low-income consumers, opening new markets that were previously out of reach. This can increase sales volume and revenue (Radjou & Prabhu, 2015).

Agarwal, Grottke, Mishra, & Brem (2017) explain that Frugal innovation often creates products that are accessible to a wider segment of society, including low-income groups. It not only expands the customer base but also improves people's well-being by providing them with the products they need at affordable prices. Frugal innovation often involves using fewer resources and more efficient production processes, which reduces waste and emissions. Products designed to last longer or be easier to recycle also help reduce environmental impact (Tiwari & Herstatt, 2014).

Companies that implement frugal innovation can enhance their reputation as leaders in sustainability and social innovation, attracting more customers and investors who care about corporate social responsibility (Rao, 2013). Therefore, by combining economic, social, and environmental goals, companies can

ensure long-term sustainability. It is not only about financial gain but also about ensuring businesses can survive and thrive in the long term without damaging the environment or neglecting society's needs (Bocken, Short, Rana, & Evans, 2014).

CONCLUSION

This study shows that mental model disruption, entrepreneurial knowledge, and the business ecosystem have a significant positive influence on frugal innovation, which in turn contributes to sustainable performance in micro-businesses in the fashion sector in Indonesia.

Mental model disruption has a significant positive influence on frugal innovation ($p\text{-value } 0.001 < 0.05$). This shows that the higher the mental level of the disruption model, the higher the level of frugal innovation. Microbusiness owners and managers who can change established mindsets and assumptions can develop creative ways to overcome resource constraints and improve operational efficiency. They must have a positive mindset to take action and adapt to improve business performance.

Entrepreneurial knowledge also has a significant positive influence on frugal innovation ($p\text{-value } 0.003 < 0.05$). Deep entrepreneurial knowledge enables entrepreneurs to identify market opportunities, use resources efficiently, and develop innovative cost-effective products. They must continually learn and adopt the latest trends to avoid falling behind in business knowledge.

The business ecosystem strengthens the relationship between a disruption-model mentality and frugal innovation ($p\text{-value } 0.001 < 0.05$). The business ecosystem provides access to additional resources, collaboration platforms, and institutional support, which help companies develop and implement frugal

innovations more effectively. Establishing relationships with the government and fashion communities, and even collaborating with businesses in other sectors, can help reach a wider market.

Frugal innovation has a significant positive influence on sustainable performance ($p\text{-value } 0.000 < 0.05$). Frugal innovation helps companies reduce production costs, improve resource efficiency, and create affordable products for low-income consumers, thereby improving the company's economic, social, and environmental performance. Innovation does not have to be expensive. Frugal innovation can also improve business performance. Micropreneurs must continuously provide added value to differentiate products from competitors. In addition to creativity, it is necessary to always update knowledge, trends, and collaboration to be able to understand the market to improve performance.

Practical Implications

The findings offer several practical implications for fashion micro-entrepreneurs, ecosystem actors and policymakers. First, fashion micro-entrepreneurs should regularly question established business assumptions and involve their teams in rethinking how products are designed, produced, and sold, as mental model disruption drives frugal innovation (H1). They should also strengthen their knowledge of markets, finance, and, in particular, affordable digital technologies, which enhances their capacity for frugal innovation (H2).

Second, since frugal innovation improves sustainable performance (H4), entrepreneurs should treat resource constraints as opportunities, for example by reusing fabric waste, adopting pre-order systems to reduce unsold stock, and using simple technologies to improve efficiency.

Third, the moderating role of the business ecosystem (H3) suggests that associations, suppliers and communities should facilitate resource sharing, peer learning, and market access so that new ideas can be translated into innovations.

Furthermore, government and universities can design integrated programs that combine mindset development, technology, and financial training, and ecosystem support through clusters and incubators.

Research Limitations

This study's results are limited to micro-businesses in Indonesia's fashion sector. Generalizing the results to other sectors or regions should be done carefully. In addition, using questionnaires as a data collection tool can cause respondent bias, especially if respondents provide answers they consider most socially desirable. Furthermore, several variables in this study, such as the mental model disruption and entrepreneurial knowledge, were measured based on respondents' perceptions, which can vary between individuals.

Upcoming Research Recommendations

Future research can replicate these studies in other business sectors and geographic regions to test the consistency of the findings. Future research may also combine qualitative and quantitative approaches to provide deeper insights into the mechanisms behind how mental models of disruption and entrepreneurial knowledge influence frugal innovation. Future research may explore other moderating factors beyond the business ecosystem, such as organizational culture or technological support, that may influence the relationship between mental model disruption, entrepreneurial knowledge, and frugal innovation to

enhance the sustainable performance of micro-enterprises.

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