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Article

Inclusivity in the sustainability of micro and small enterprises based on digital technology: A case study in central Java, Indonesia

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Abstract: The covid-19 pandemic has adversely affected the sustainability of micro and small enterprises (MSEs), with a particularly pronounced impact in Central Java. Entrepreneurs who struggle to adapt to reduced consumer purchasing power and the increasing reliance on digital technology are at heightened risk of business closure. Despite these challenges, inclusivity remains a crucial element for MSEs in fostering local economic development. Accordingly, this study seeks to examine the role of inclusivity in the sustainability of MSEs that are based on digital technology. Data were collected through the use of questionnaires and focus group discussions. Respondents were digital-based MSEs entrepreneurs from five selected regions, with Central Java having the largest number of digital media users. Key informants included experts from Diponegoro University, the International Council of Small Business (ICSB), the Department of Cooperatives and Micro, Small and Medium Enterprises at the provincial and district levels, and non-governmental organizations. The collected data was analyzed using the Rapid Appraisal for Micro and Small Enterprises (Rap-MSE's) method. To assess the sustainability status, the study utilized several dimensions, including economic, environmental, social, institutional, technological, and inclusivity factors. Both multidimensional and individual analyses indicated that the sustainability status was relatively robust. MSEs that integrated digital technology into their operations were able to withstand the challenges posed by covid-19 and adapt to the new normal. In conclusion, the inclusivity dimension in the adoption of digital technology has gained increased importance in driving local economic development.

Keywords: social; economy; environment; institutional dimension

1. Introduction

Indonesia, with its vast population and abundant natural resources, holds significant potential for economic enhancement (Triharmoko and Susilo, 2024). Compared to others, the country has a fairly stable economic condition (Anas et al., 2022). In mid-2020, the covid-19 pandemic greatly impacted the world community (Bani-Sadr et al., 2020). The World Health Organization (WHO) provided regulations limiting outdoor activities to prevent the spread of the virus (Jacobsen and Jacobsen, 2020), and the Indonesian government followed suit. This condition had a major impact on various sectors, including trade, tourism, education, transportation, health, manufacturing, and agriculture (Malahayati et al., 2021; Nayak et al., 2022). The majority of entrepreneurs across various sectors operate micro and small enterprises (MSEs) (Singgalen, 2023), which play a significant role in the Indonesian economy.

In 1997, MSEs were essential in saving the country's economy during the major financial crisis in Asia (Rifai et al., 2016). Although large enterprises experience significant losses and collapse, MSEs still manage to survive and become pillars of the economy (Ragil, 2021).

The number of enterprises has been increasing continuously and is expected to reach 66 million in 2023. These enterprises contribute 61% to the Gross Domestic Product (GDP), equivalent to 9580 trillion rupiah (Suhayati, 2023). According to the Central Statistics Agency (2022), microbusinesses dominated this sector and have grown from 2020 to 2022. However, there was a 170,359 unit reduction from 2019 to 2020 due to the quick development of covid-19. Some entrepreneurs intentionally closed their businesses in response to government efforts to reduce the number of affected victims. This situation led to a decline in profits, prompting some entrepreneurs to implement large-scale layoffs as a cost-saving measure (Antara and Sumarniasih, 2022).

Most enterprises have closed down their businesses due to restrictions on economic activities. This situation created the concept of using digital media as a platform for selling. As a result, entrepreneurs choose to sell online through social media platforms such as Facebook, WhatsApp, Twitter, Instagram, TikTok, and others (Hidayati and Yansi, 2020). Social media, which was initially designed as a means of communicating, sharing, and obtaining information, has turned into an effective marketing medium (Purbey, 2020). According to Indonesian online media, the country had 167 million active social media users in January 2023, accounting for 60.4% of the total population. On average, these users spend 3 h and 18 min per day on social media (Widi, 2023). Werling et al. (2021) discovered that social media engagement increased dramatically during lockdowns or social activity limitations.

This condition benefits entrepreneurs who master technology by allowing them to capitalize on the opportunity to increase sales while adhering to social interaction constraints through the marketplace platform. According to the Ministry of Trade (2023), the digital economy in Indonesia shows great potential, with electronic commerce transactions expected to reach 476.3 trillion rupiahs in 2022, an increase of 18.7% from the previous year. Digitalized MSEs had reached 20.9 million units and experienced an increase of 17% from the previous year (Suhayati, 2023). This condition opens up a great opportunity for the creative market to survive and compete in Industry 4.0. On the other hand, the new normal era encourages conventional micro-entrepreneurs and new entrepreneurs to adapt to changes by using digital transactions and redesigning business models (Riptanti et al., 2024). The adopted strategy must be rapidly adapted at all levels, including organizational, enterprise, corporate, and business unit levels.

Industry 4.0 requires all business sectors to always be innovative, creative, and able to collaborate with diverse sectors. According to Hanaysha et al. (2022), the industry can survive and continue in business due to the ability to create innovations that differentiate it from competitors. The survival of a business cannot be separated from the ability to manage its resources. Successful resource management can have a substantial impact on business performance throughout the recovery phase after the covid-19 pandemic and in the current new normal era. Ragil (2021) identifies two critical factors for improving micro-business performance, including internal and

external factors. Internal factors consist of the abilities and competencies of entrepreneurs, business experience, access to funding, and use of technology (Loku, 2020), while external factors comprise government policies, social and economic aspects, market conditions, and infrastructure conditions (Engidaw, 2021).

To increase the performance of MSEs, industrial digitalization must be accelerated in order to support competitive and sustainable development (HS and Himawati, 2024). However, MSEs are capable of having different business performance levels. Entrepreneurs who survive can become formidable competitors or profitable partners. In this context, the issue of sustainable performance is necessary for supporting the nation's economy during economic recovery in the new normal era. MSEs entrepreneurs understand the value of a multicultural workforce and creating an inclusive business environment in the global economy (Pless et al., 2004). Inclusivity covers hiring people with disabilities, which requires entrepreneurs to change their procedures. It also includes offering products and services to underprivileged communities, which drives local economic development (Wach and Elise, 2012). MSEs' business performance cannot be separated from inclusiveness, so this is interesting to research. Does inclusivity contribute to the sustainability of digital technology-based MSEs in Central Java?

Sustainability necessitates entrepreneurs' consideration of several key dimensions, including environmental, economic, and social aspects. (Huang et al., 2023). Additional dimensions of MSEs sustainability, such as institutional, technology, and inclusiveness, should also be considered (Maksum et al., 2020). Enterprises should try to improve the welfare of the surrounding community in addition to making a profit (Dyllick and Muff, 2016). This study's originality resides in the dimension of inclusivity. The emphasis on business performance and aggressive business competition usually affects enterprises that promote the welfare of the surrounding environment. Therefore, this study aims to analyze the role of inclusivity in the sustainability status of digital technology-based MSEs during the new normal era of economic recovery.

Literature review

Sustainable Micro, Small, and Medium Enterprises are explained through the concept of business sustainability typology developed by Dyllick and Muff (2015). Some business sustainability concepts include Business Sustainability 1.0 (Refined Shareholder Value Management), Business Sustainability 2.0 (Managing for the Triple Bottom Line) and Business Sustainability 3.0 (True Sustainability). Business Sustainability 3.0 emphasizes how businesses can use their resources, competencies, and experience to address economic, social, or environmental challenges/dynamics. This means a holistic approach is needed to address sustainable business challenges in the future (Ogrean and Herciu, 2020).

Inclusive entrepreneurship policies are designed to mitigate market failures (Schoneveld, 2020). This index assesses inclusivity across three dimensions: gender (policies supporting women entrepreneurs), age (policies supporting youth entrepreneurs), and disability (policies supporting entrepreneurs with disabilities). The

primary objective of these policies is to expand business opportunities and foster broader engagement in entrepreneurial activities.

2. Materials and methods

The study was conducted in Central Java Province, with Indonesia's third-highest number of MSEs accessing the Internet (Tusianti et al., 2016). The selected locations with the largest MSEs internet users included Jepara, Pemalang, Semarang City, Klaten, and Tegal (BPS, 2019). The respondents were divided into two groups: micro business entrepreneurs from diverse fields and specialists in the MSEs sector. The initial group comprised 75 entrepreneurs, with 15 respondents from each regency/city. The first group of respondents was selected using purposive sampling. The selected group included those holding an electronic Micro and Small Business Permit (e-IUMK), had used digital media for at least 3 years, had been in business for at least 5 years, and had represented the clustering of MSEs business sectors in each district. Each business cluster has an organization that oversees it at the village, sub-district, and district levels so that the entrepreneurs selected represent a particular business cluster. Each district has 10–15 business clusters, so 1–2 entrepreneurs represent each 1 business cluster. Respondents were selected using snowball sampling, and their data was mapped based on these criteria. The second group of respondents included experts from the Diponegoro University Business Incubator, the International Council of Small Business (ICSB), Provincial and Regency Micro, Small, and Medium Enterprises and Cooperative Services, and Non-Governmental Organizations (NGOs). Two experts from each relevant field were selected, resulting in a total of 10 experts. These experts were involved in validating and confirming the assessment results of the indicators for each dimension based on in-depth interviews conducted with the initial group.

Data were analyzed using the Multi-Dimensional Scaling (MDS) method in conjunction with the Rapid Appraisal for Micro and Small Enterprises (Rap-MSEs), which was a modification of the Rapid Appraisal for Fisheries (Rapfish) developed by Alder et al. (2000); Kavanagh and Pitcher (2004). This analysis results provided sustainability index value, which might be used to determine sustainability status. Index values varied from 0–100, representing a range of unsustainable to sustainable status (Irianto et al., 2021; Riptanti et al., 2022). To analyze sustainability status, dimensions used included economy, environment, social, institutional, technology, and inclusivity. Each dimension consisted of several attributes used as assessment indicators, as shown in **Table 1**. The class value for each attribute ranged from 0 to 3, with 0 indicating poor performance and 3 indicating good performance. In cases where no reference sources were available, the value of each attribute was determined through focus group discussions (FGDs).

The determination of research dimensions and attributes was guided by sustainability theory, observations of MSEs, relevant prior research findings, focus group discussions (FGDs) with relevant stakeholders, and consideration of novelty to contribute to the advancement of scientific studies.

Table 1. Dimension and attributes of sustainability.

Dimension	Attribute	Source
Economy	Production continuity Business risk Operating profit Market demand Business competition Substitute products Scale enterprises Business efficiency	Madyaratry, L. H., et al. (2020); Iskandar, Y., et al. (2024); Susanti, E., et al. (2023)
Environment	The impact of business on the physical environment Business/production waste The impact of business on labor absorption Changes in consumer demand Changes in consumer preferences Consumer awareness Producer awareness of waste management Producer compliance with environmental management	Madyaratry, L. H., et al. (2020); Derhab, N. and Elkhwesky, Z. (2023); Nursini, N. (2020); FGD
Social	Community welfare in the business environment Business institutions Social conflict Consumer lifestyle Relationships with manufacturers or providers of similar services Relationship with suppliers Producer lifestyle	Madyaratry, L. H., et al. (2020); Tresnasari and Zulganef (2023); Wang et al. (2019); FGD
Institutional	The role of relevant agencies in improving MSEs performance Business licensing facilitation Capital facilitation Marketing facilitation Technology facilitation Institutional facilitation	Hamdan, H. (2021); Hariyono, A., and Narsa, I. M. (2024); Agarwal, V., et al. (2020); FGD
	Partnership with associations/paguyuban/organizations that oversee the business	
Technology	Mastery of technology Access technology Price of technology Technological innovation Use of digital technology Ease of imitation of products/services Ease of use of technology	Martínez-Peláez, R., et al. (2023); Budianto, R., et al. (2023); Irianto, H., et al. (2023); FGD
Inclusivity	Inclusion of disabled workers Selling products and services needed by poor people Local economic growth Development of high-social value businesses Engagement of child/minor workers Employment discrimination (ethnicity, religion, race) Gender of the workforce	Keating, B. W., and Worsteling, A. (2023); Shayan et al. (2021); Expósito, A., et al. (2023); FGD

3. Results and discussion

3.1. Characteristics of digitalization-based MSEs

Based on the status of business ownership, micro and small entrepreneurs primarily operated self-owned enterprises, as illustrated in **Figure 1**. A smaller proportion of businesses were legacy or cooperative enterprises, reflecting a strong entrepreneurial spirit. Starting a business requires courage, perseverance, and effective business management (Allal-Chérif et al., 2023). Entrepreneurs with high self-efficacy were more likely to successfully develop their businesses, as they possessed the

confidence and skills to seize opportunities for success. High self-efficacy was linked to stronger entrepreneurial intentions and positive attitudes toward starting a business (Sahid et al., 2024). This contrasts with inherited enterprises, which often require less effort to establish. Conversely, cooperative enterprises have not gained significant interest among MSE entrepreneurs, largely due to a lack of trust in partners, limited prospects for collaboration, and an inability to fully exploit these opportunities. These findings align with the study conducted by Cheng et al. (2023) in China, which noted that entrepreneurs often perceive self-owned enterprises as having higher status compared to other business forms.

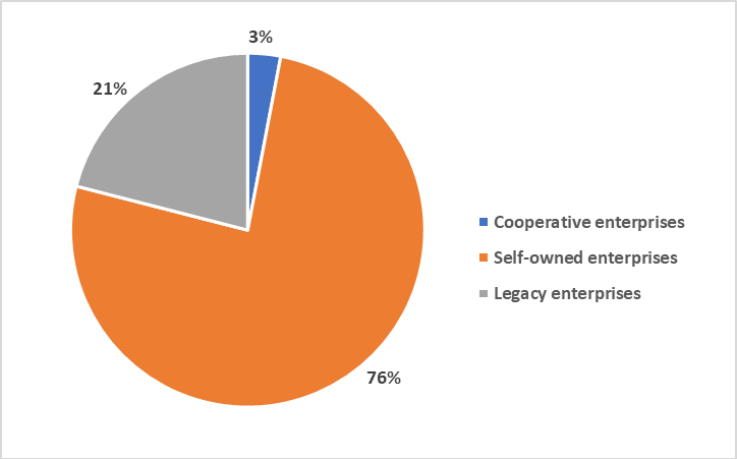

Figure 1. Status of MSEs entrepreneurs.

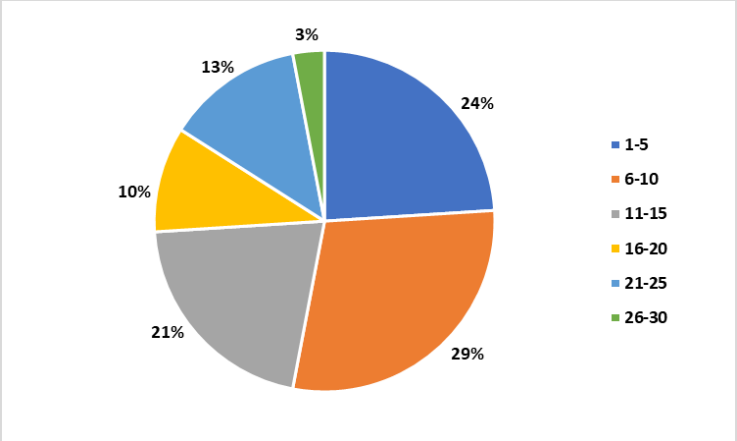

Figure 2. Length of business run (years) by MSEs entrepreneurs.

The use of digital technology during covid-19 was essential for facilitating production, marketing, and payment processes (Lashitew, 2023; Phung et al., 2024). However, after the pandemic or in the new normal era, the use of technology by MSEs entrepreneurs has decreased, particularly among established businesses. **Figure 2** shows that most enterprises have been in operation for 6–10 years. Enterprises that have been around for a while tended to choose established partnership networks over digital technology. Several factors contributed to micro and small entrepreneurs' unwillingness to use digital technology after covid-19. The factors influencing this included familiarity and comfort with conventional business practices, aligning with

findings by Dyba and Di Maria (2024) in 22 EU countries. This sense of convenience led MSEs to perceive the transition from conventional to digital-based businesses as abstract and unnecessary. Additionally, limited resources made managing services and sales through e-commerce appear costly, leading entrepreneurs to believe it could negatively impact their business finances (Mancuso et al., 2023). Another challenge was that MSE entrepreneurs often lacked the necessary knowledge and expertise to operate digital technology effectively, largely due to their low levels of education (Kilay et al., 2022).

The use of digital technology depended on the business field because not all products could be bought and sold online. For some enterprises, it was not easy to use such technology for internet marketing, as shown in **Figure 3**. Not all craft products could be marketed online because they were custom-made and require more personal interaction and explanation with consumers (Chen et al., 2022). Similarly, in the fashion business sector, not all fashion products might be marketed online since some, such as eco-print fabric and custom batik, were produced in limited quantities. Previous reviews showed that entrepreneurs who produced fashion and crafted products, particularly batik did not adopt digital technology for sales and advertising due to limited resources and the opportunities for plagiarism of batik motifs by others (Kristiningrum et al., 2021).

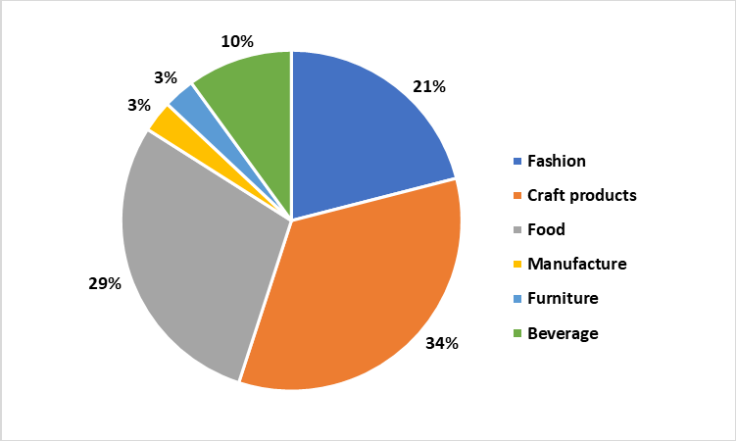

Figure 3. MSEs sector groups.

Digital technology was beneficial for entrepreneurs because it was used to expand marketing reach (Lashitew, 2023). The more efficiently and optimally digital technology was used in MSEs, the easier it was to achieve market expansion (Salah and Ayyash, 2024). Furthermore, business experience and longevity were important in accessing the market through business networks in various regions. This explains why not all entrepreneurs rely on digital technology for product marketing. Some continued to use the conventional method but achieved a national scale through the engagement of partners and business networks, as summarized in **Figure 4**. For instance, one beverage enterprise could market exports without using digital technology. This happened because MSEs had a network with relevant stakeholders who connected their products with consumers in the global market. Stakeholder engagement in the network created opportunities to promote business products at no cost, thereby increasing reputation and credibility (Nuryanto et al., 2024).

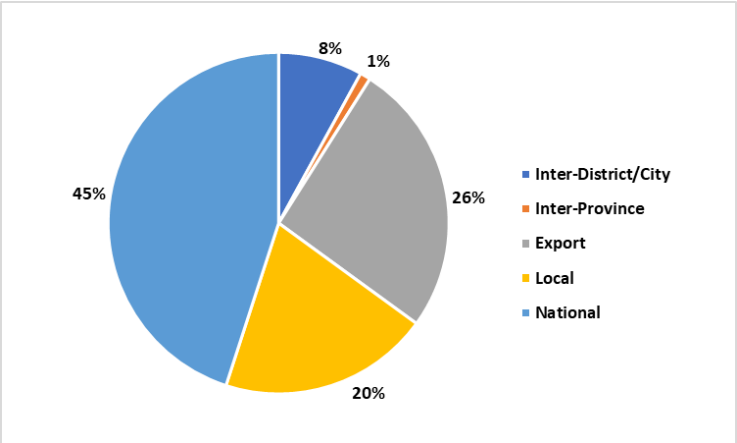

Figure 4. MSEs marketing areas.

3.2. Status of sustainability of digital technology-based MSEs in the new normal era of economic recovery

MSEs faced many challenges during the covid-19 pandemic. Entrepreneurs who were unable to survive changing economic conditions and competitive situations would experience business closure (Cadden et al., 2023). Those who adapted to these conditions could increase turnover and create new business opportunities (Salah and Ayyash, 2024). However, only a small percentage of entrepreneurs succeeded in adapting to the conditions. The use of digital technology became an adaptation effort for economic recovery in this new normal era.

On a multidimensional scale, MSEs' sustainability status was quite sustainable, as shown in **Table 2**. This showed that business sustainability was quite sustainable in various economic, environmental, social, institutional, technology, and inclusivity dimensions.

Table 2. Index and sustainability status of MSEs.

Dimension	Index Value	Sustainability Status
Economy	54.99	Quite Sustainable
Environment	50.63	Quite Sustainable
Social	59.26	Quite Sustainable
Institutional	72.22	Quite Sustainable
Technology	57.97	Quite Sustainable
Inclusivity	57.86	Quite Sustainable
Multidimensional	58.82	Quite Sustainable

The sustainability of these results was in line with the study conducted by Avelar et al. (2024) in 16,365 SMEs in 27 EU countries and 12 non-EU countries. MSEs had high resilience in entrepreneurship, and the courage to open, close, and change businesses in response to failure was a defining characteristic of these entrepreneurs (Qu and Zollet, 2023).

3.2.1. Economy dimension

The economic dimension exhibited a relatively sustainable status, as illustrated in **Figure 5**. Technology-based MSEs provide substantial economic value compared to non-technology-based businesses, which is evident in aspects such as business efficiency, scale, substitute products, competition, market demand, profits, risks, and continuity. This dimension indicated that MSEs were relatively stable and capable of long-term survival despite the covid-19 pandemic. The consistent demand for their products supported stable production sustainability in Central Java (Susilo, 2020). This finding contrasts with the research by Leha and Penu (2023), which reported lower economic sustainability for MSEs due to factors such as limited knowledge and skills in using digital technology.

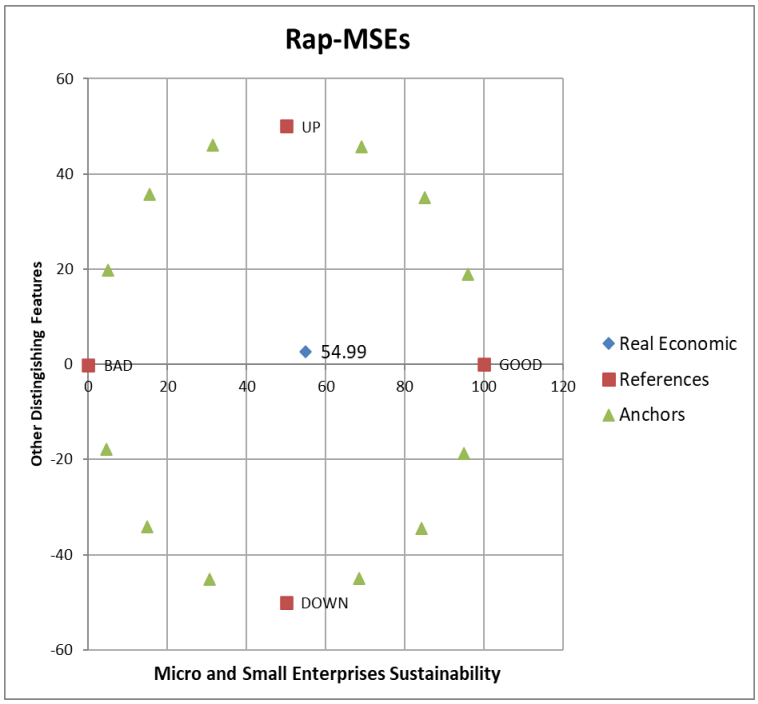

Figure 5. Rap-MSE's on economy dimension.

The results of the analysis showed that the attributes of business competition and substitute products were crucial in improving sustainability status. **Figure 6** presented that this indicator had the highest Root Mean Square (RMS) values. Business competition was intense across various fields, with a large number of competing enterprises and an array of new products being introduced. Several factors, such as trends, changes in consumer tastes, and technological developments, further promoted a competitive environment (Rosas et al., 2022).

The existence of substitute products influenced competition in the market and offered consumers more choices, thereby promoting enterprises to improve the quality and efficiency of their business (Zhang and Li, 2024). For instance, the fashion business sector had a variety of substitute products, including batik cloth, eco-print, lurik, goyor sarongs, and troso weaving. In facing intense competition with various products in the market, fashion entrepreneurs have to innovate. The creation of unique

motif designs and colors that followed consumer tastes was one of such innovations (Raya et al., 2021). Prices for substitute products varied based on the quality and originality of the motif offered. Therefore, it was necessary to streamline production operations to offer competitive prices (Chen et al., 2021). In craft businesses, competition also promotes efficiency, innovation, and product or service quality. Enterprises must continually innovate and improve performance to increase economic sustainability (Ratnaningtyas et al., 2016).

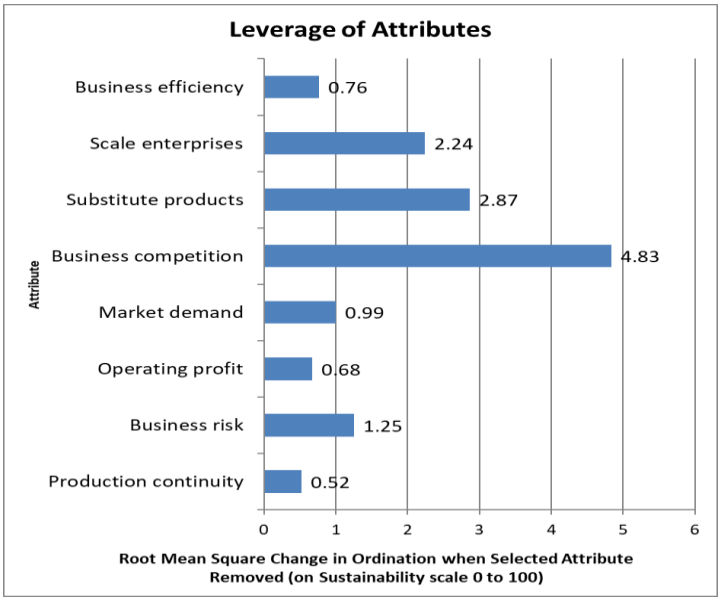

Figure 6. RMS on economy dimension.

On average, substitute craft products had low prices but did not match the quality of original products. Consumers' behavior that prioritized quality increased business competitiveness (Raya et al., 2021). The food and beverage sector also experienced high competition and various substitute products, consistent with the results of Montalbano and Nenci (2022) in 189 countries. The majority of substitute products in this sector had selling prices that were much lower than mass-produced products from the processing industry. On the other hand, in the manufacturing sector, substitute products tended to be more expensive. As a result, MSE entrepreneurs were able to maintain quality and service, ensuring that consumers continued to choose their products (Qu and Zollet, 2023). In the furniture sector, while substitute products were offered at lower prices and provided appealing and varied options, MSE entrepreneurs remained economically sustainable by consistently updating their designs to emphasize uniqueness and align with market trends.

3.2.2. Environment dimension

Based on the results of the analysis, as shown in **Figure 7**, the environmental dimension had quite a sustainable status. Generally, this indicator supported the achievement of sufficient environmental sustainability, consistent with the study conducted by Tóthová and Heglasová (2022) in 27 EU Countries. MSEs entrepreneurs had a good awareness of waste management and environmental impact, thereby minimizing a negative impact on the environment (D'Adamo et al., 2023). These entrepreneurs also empowered the surrounding community in absorbing labor,

resulting in a high sense of belonging among the workforce for business sustainability. The results were in line with the observation of Sultana et al. (2023) that the support of its workforce determined business sustainability. Moreover, MSEs entrepreneurs had a high level of adaptability, allowing them to adjust to consumers' demands and preferences quickly.

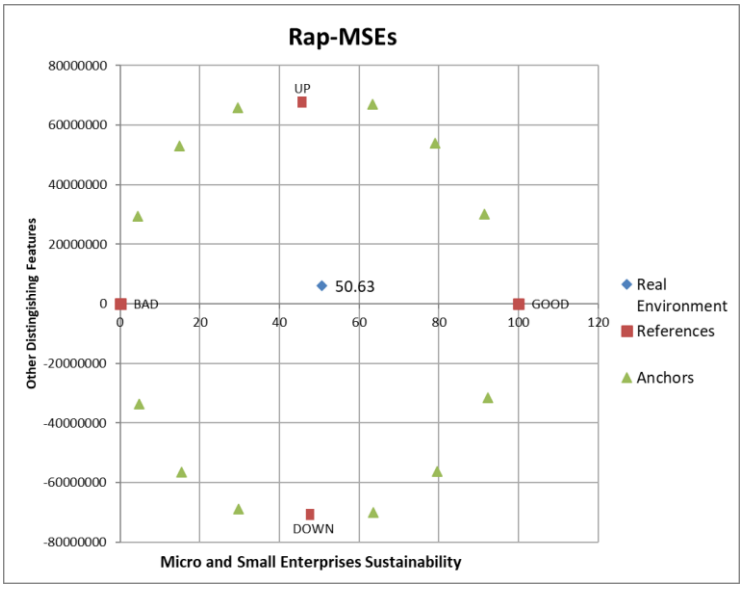

Figure 7. Rap-MSE's on environment dimension.

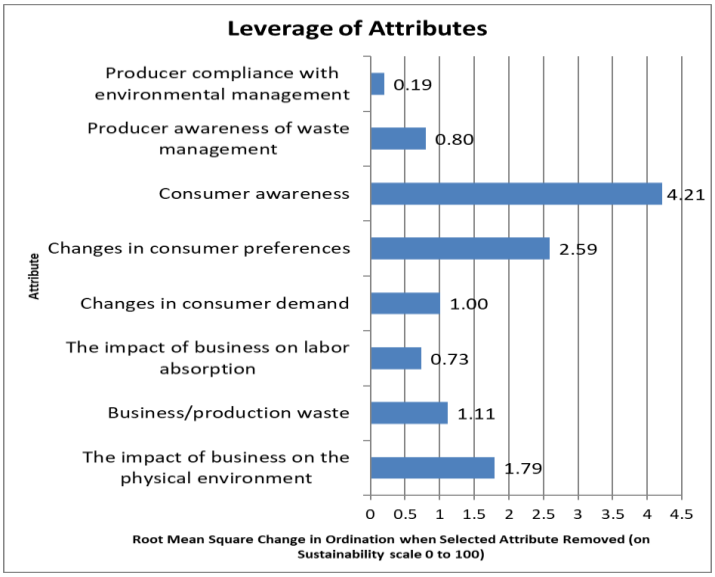

Figure 8. RMS on environment dimension.

Attributes that leveraged the improvement of sustainability status, as presented in **Figure 8**, included awareness and changes in consumer preferences. In the food and beverage sector, consumers' awareness of health benefits improved product popularity, particularly for products subjected to laboratory testing. This showed that business sustainability status was influenced by consumers' awareness of the benefits provided by the food and beverage products being bought and sold (Tóthová and Heglasová, 2022). Consumers were increasingly selective, considering not only taste and price but

also quality, benefits, design, comfort, durability, and product reliability (Park and Li, 2023). The increasingly consumerist nature of consumers and awareness of products in the market was one of the drivers for product purchases (Safi, 2022). These characteristics influenced the increase in demand and purchases of goods/services produced by MSEs entrepreneurs.

Changes in consumer preferences resulted in changes in demand for goods and services (Ren et al., 2023). The results showed that there had been a change in consumer preferences, resulting in purchasing products produced by MSEs entrepreneurs in the study area. Factors such as price, quality, and product uniqueness influenced purchasing behavior (Park and Li, 2023). This showed that the products produced by entrepreneurs could attract consumers, thereby improving environmental sustainability status. The government's initiative to protect MSE products, known as "Cintailah Produk Dalam Negeri dan Beli Produk Dalam Negeri" (which translates to "Love Domestic Products and Buy Domestic Products"), has positively impacted consumer awareness and shifted preferences. The growing quality of MSE products is further supported by producers' ability to manage their waste effectively.

3.2.3. Social dimension

Based on the analysis in **Figure 9**, the social dimension had a relative sustainable status. This dimension included aspects related to social welfare, inclusion, justice, and relationships between various stakeholders in society (Pfajfar et al., 2022). The social dimension supported the achievement of a fairly sustainable status. MSEs could improve the prosperity of the business environment based on the multiplier effect, leading to the absence of social conflict (Alghababsheh et al., 2023). They did not have a formal organizational structure, as operating as individual business institutions, consistent with the study conducted by Cadden et al. (2023) in 194 UK SMEs.

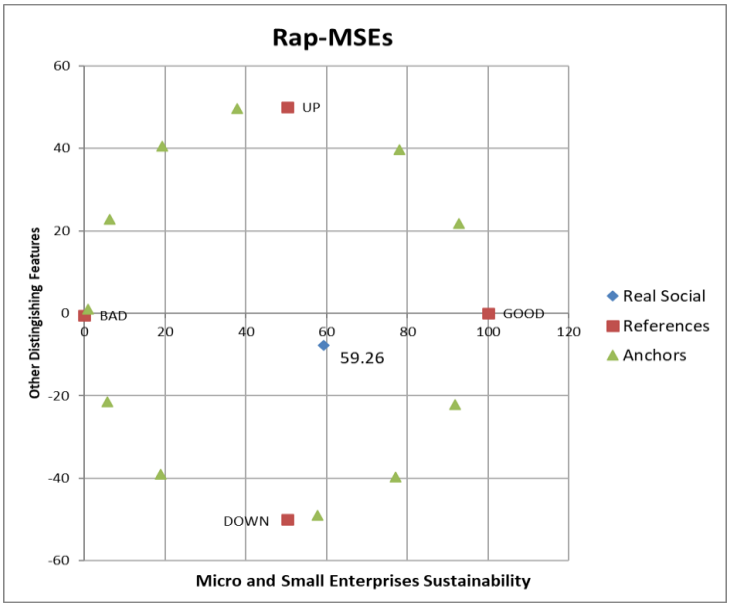

Figure 9. Rap-MSE's on the social dimension.

Attributes that leveraged (**Figure 10**) the improvement of sustainability status included relationships with producers or service providers and business institutions. Synergistic relationships have played a crucial role in enhancing business

sustainability (Holubˇcík, 2023). Strengthened connections between enterprises and producers or service providers, including partnerships, fair trade practices, and adherence to business ethics, have supported and promoted sustainability (Ma et al., 2024). Most of the business sectors in the study area showed that the relationships between producers were collaborative. The pressure of sharing almost the same needs, consumers demand, and capabilities were factors that fostered collaboration between these entrepreneurs (Uttam et al., 2022). Cluster support in each research area, encompassing the procurement of raw materials to product marketing, is crucial for enhancing business sustainability.

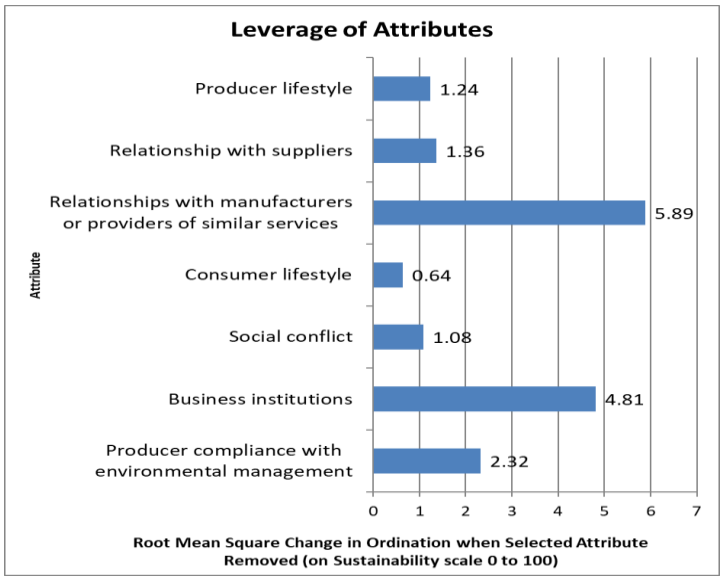

Figure 10. RMS on the social dimension.

The majority of MSEs entrepreneurs operated as individual business institutions. The institutions could be upgraded to formal institutions, including cooperatives, businesses, or limited liability enterprises, strengthening the foundation for business sustainability (Luo et al., 2020). In the fashion sector, there was a batik business structured as a cooperative, which was capable of reviving the businesses of members due to its wider working network (Fernández-González et al., 2020). A fair profit-sharing system and job descriptions could cause members to be loyal to the cooperative sustainability. Furthermore, strong business institutions tended to ensure compliance with social and environmental standards. Cooperative was considered the main alternative that guarantees business for good entrepreneurs from various sectors, supported by statutory regulations. Cooperatives are established on the basis of fulfilling the needs of their members, both in terms of raw materials, capital, and marketing. Therefore, it is very appropriate to establish a cooperative in a business cluster that has similar businesses.

3.2.4. Institutional dimension

The institutional dimension, as shown in **Figure 11**, had a fairly sustainable status. Institutions that are engaged in a system have adequate capabilities to support its continuity (Ghoniyah et al., 2024). All indicators of this dimension supported the achievement of sufficient sustainability. Furthermore, the government, through the

Department of Micro, Small, and Medium Enterprises and Cooperative, institutionally provided various facilitations in improving the performance of MSEs. The facilitations included training in digital marketing, digital business, business licensing, capital, institutions, and business partnerships (Marra, 2022). Annually, central, provincial, and district governments offer marketing and technology support to business groups that meet specified criteria and are prioritized for business development. The results of this study were in line with those of Madyaratri et al. (2020), who state that institutional roles play a role in introducing and marketing MSE products.

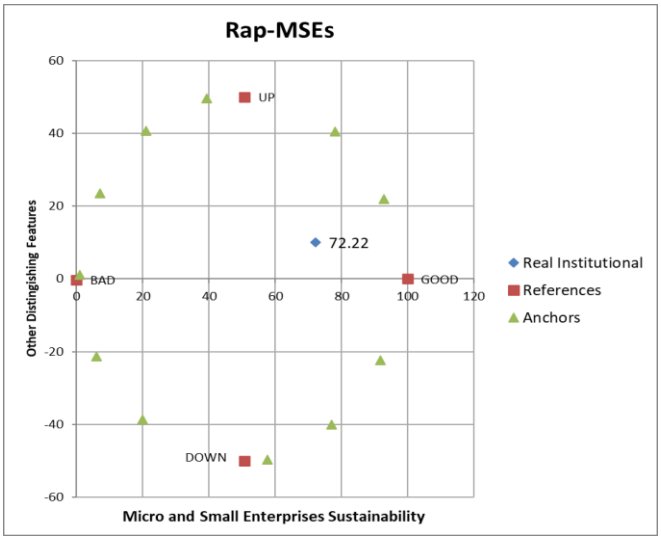

Figure 11. Rap-MSE's on institutional dimension.

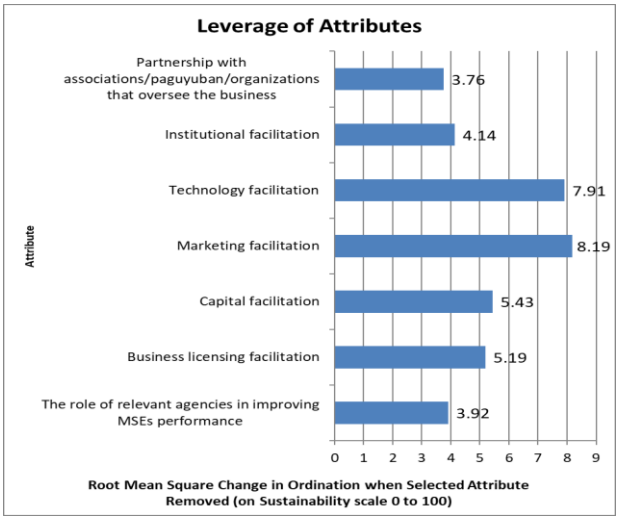

Figure 12. RMS on institutional dimension.

The sustainability status of the institutional dimension could be improved through the attributes of marketing and technological facilitation (**Figure 12**). Marketing facilitation refers to efforts to strengthen the relationships between producers and markets, as well as increase producers' access to wider markets (Park and Li, 2023). In the study area, the government policies adopted in each business sector did not significantly differ in regencies. The policies included training in digital marketing, providing product exhibition facilities, purchasing MSEs products in the procurement

of goods and services, as well as developing online applications for marketing local products. A significant example of a developed online application was the local e-catalog, mbizmarket, the Bangkit platform in Tegal Regency, and other local platforms.

Technological facilitation refers to the application and diffusion of new technologies that could increase efficiency, productivity, and sustainability in a system. The facilitation tended to reduce production costs, improve product quality, and open up new opportunities for producers (Marra, 2022). MSEs facilitating technology could gain greater support from stakeholders, strengthening institutional sustainability (Blakeney, 2022; Kashina et al., 2022). The fashion, craft, beverage, and food business sectors did not receive technological facilities because they used the traditional method. However, the pottery craft was supported by the Klaten Regency Government to use patent traditional pottery technology called tilt-turning tools. For products such as coffee that required technology, technological facilities were provided to MSEs in the form of coffee roasting equipment. The government's role in providing such facilities aimed to increase the competitiveness and quality of local coffee as a regional superior product (Mehrez et al., 2023). Additionally, an achievable technological facilitation was technology that could increase the efficiency and superiority of local products.

3.2.5. Technology dimension

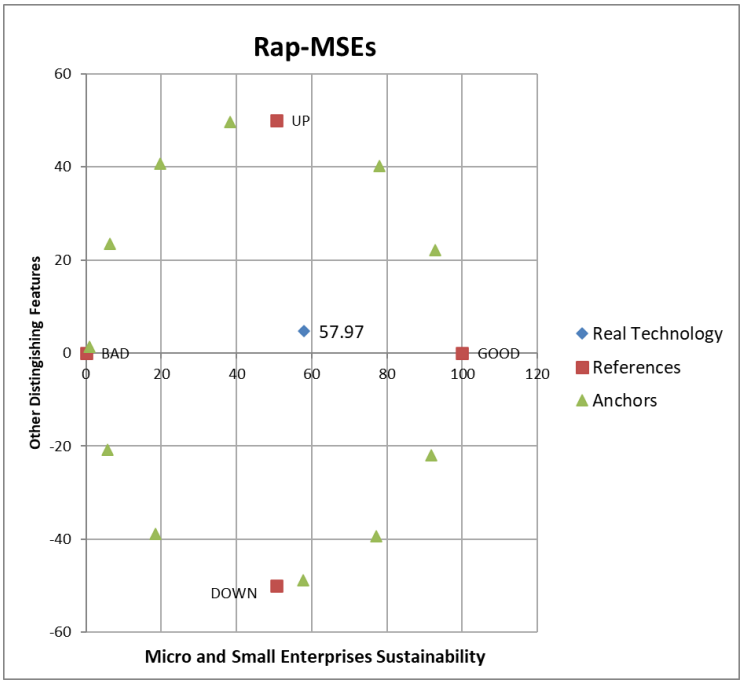

Figure 13. Rap-MSE's on technology dimension.

Based on the analysis shown in **Figure 13**, the technology dimension had a fairly sustainable status. This showed that the use of technology in a system was sufficient to support sustainability (Shariff et al., 2022). Therefore, entrepreneurs quickly adopted and utilized digital technology in their business processes. The covid-19 pandemic necessitated the use of technology, as it addressed challenges related to marketing and transactions. Digital technology proved to be cost-effective, leveraging applications available on gadgets or cell phones. During the pandemic, online marketing platforms, such as Shopee, Gojek, Tokopedia, Bukalapak, and others,

significantly facilitated transactions for entrepreneurs. E-money applications, including Gopay, Tapcash, Ovo, LinkAja, and others, were also utilized for transactions. These conveniences effectively brought consumers closer to accessing the products they needed (Kilay et al., 2022). In general, MSEs are supported by family members in using online media in marketing and payments in their business operations. The millennial generation and generation Z, who are the heirs of the business, are more responsive in implementing this technology. The results of this study are in line with the study of Kurniawan et al. (2023) that the use of technology, especially digital media, can reach new markets more widely so that MSEs can survive and continue to face times of crisis or even post-pandemic.

In the new normal era, consumers' behavior or lifestyle tended to shift to direct purchases in physical stores. The behavioral change also occurred among entrepreneurs who intended to abandon the use of digital marketing. This was attributed to the strong partnership network with consumers, the complicated use of social media, and the return of loyal consumers (Handfield, 2019).

Attributes that leveraged the improvement of sustainability status included the price of technology and whether the products/services were easy to imitate (**Figure 14**). In the fashion, craft, food, beverage, manufacturing, and furniture sectors, the price of technology was relatively affordable for entrepreneurs. The affordability promoted wider adoption, while the ease of replication allowed technology to quickly spread and be adapted, increasing its scalability and impact (Soares et al., 2024). An affordable price made technology to be easily accessible to various groups, particularly MSEs and inclusive communities (Kilay et al., 2022). However, coffee processors did not benefit from low-cost technology. Entrepreneurs found it difficult to access necessary technology, particularly coffee grinding and roasting machines, due to their high prices. The quality of coffee beans was significantly determined by this roasting and grinding process (Siebald et al., 2024). In this issue, the government's role was highly expected through technological facilitation that helped entrepreneurs improve their business performance.

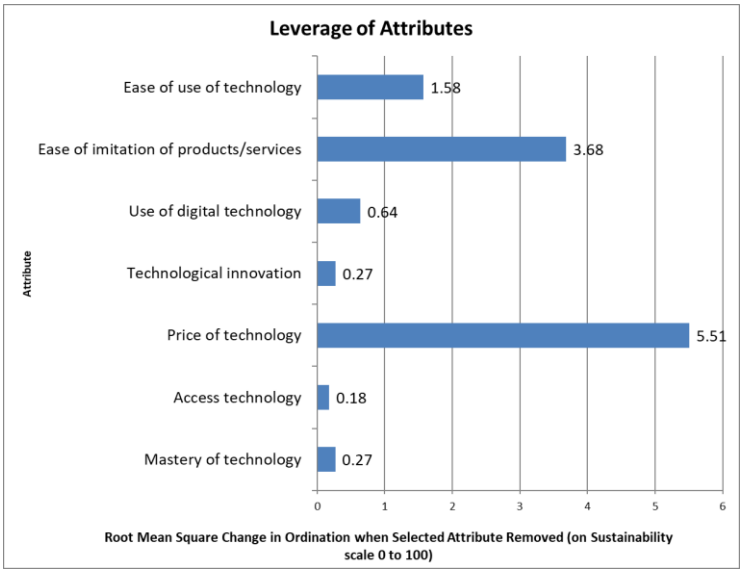

Figure 14. RMS on technology dimension.

Products produced by MSE entrepreneurs were often easily imitated due to their distinctive characteristics, leading to increased competition (Galloway et al., 2021). In the food, beverage, manufacturing, and furniture sectors, products were easy to imitate since the raw materials used were similar and the production flow was not complicated. This eased entrepreneurs to duplicate similar products (Nave et al., 2024), thereby increasing the adoption of technology in various contexts (Sohal and De Vass, 2022). Furthermore, ease of replication allowed local communities to adapt and improve technology in accordance with their needs, increasing relevance and long-term sustainability. The faster the adoption of technology, the easier it became to meet the needs on a larger scale (Mahjoub et al., 2022). Meanwhile, the nature of products in the fashion and craft sector was relatively difficult to imitate because they had unique and artistic designs that originated from the personal creativity of craftsmen. Although fashion and craft products have similar raw materials, they require special skills to be produced.

3.2.6. Inclusivity dimension

Based on the analysis presented in **Figure 15**, the inclusivity dimension had a fairly sustainable status. This showed that the existence of inclusivity in a system was sufficient to support sustainability. In the context of sustainability, inclusivity ensured that the community felt the benefits of development and economic growth (Kopnina et al., 2024). When hiring workers, MSEs entrepreneurs did not differentiate between gender and labor discrimination. Some used disabled workers who come from their environment, resulting in the reduction of unemployment. Furthermore, the products produced reflected regional characteristics, such as goyor sarongs, painted umbrellas, batik, troso cloth, monel, craft, and processed food, thereby growing the local economy. The non-formal characteristics of MSEs businesses make MSEs more accepting of disabled workers than formal businesses. Workers in MSEs do not require special requirements as in formal employment.

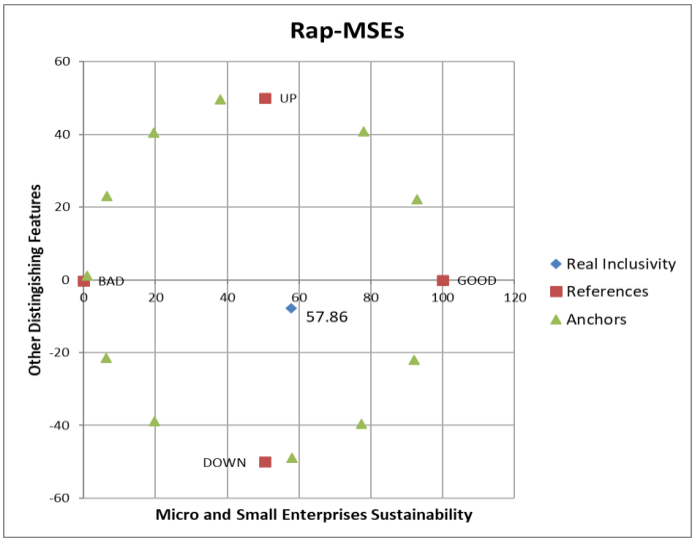

Figure 15. Rap-MSE's on inclusivity dimension.

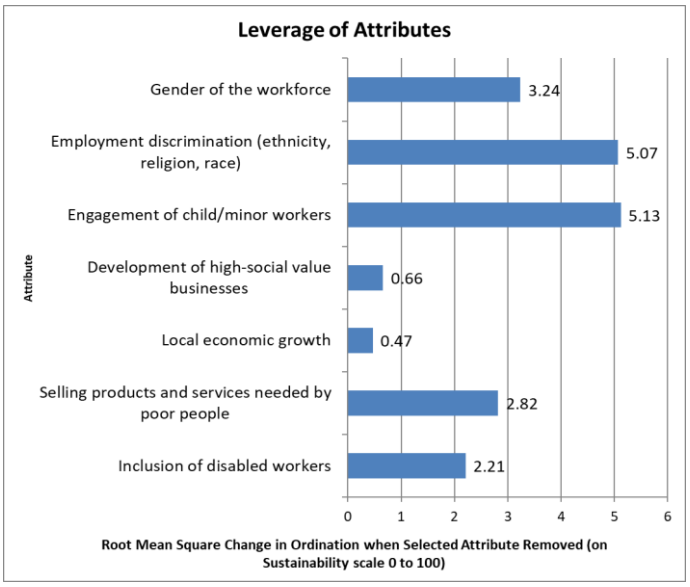

Figure 16. RMS on inclusivity dimension.

Sustainability status could be improved by leveraging the attributes of child labor engagement and labor discrimination (**Figure 16**). It was observed that normative and instrumental drivers in using social sustainability experienced two new challenges, including social and demographic factors (Ovadia, 2022). To achieve greater sustainability, promoting inclusivity through eliminating child labor engagement and discrimination was necessary. This was in line with Shayan et al. (2021) that the success of a business or company cannot be separated from compliance with applicable regulations, especially in fulfilling the 3P principle, namely profit, people, and planet. Humans are the central factor in employment, and their rights must be upheld, including adherence to age limits. In the fashion, food, beverage, manufacturing, and furniture sectors, there were no child or underage workers. This was because the workload in the sector was relatively large, leading entrepreneurs to prefer adult workers who were more experienced, emotionally stable, responsible, and compliant with labor regulations (Palmer et al., 2023). The use of child labor undermined rights and reduced the quality of human resources in the future. Children who were engaged in work usually lost the opportunity to get a proper education, which hindered the development of their skills and potential, prolonging the cycle of poverty and inequality in the community. However, labor discrimination did not occur in the business sector analyzed in this research. Entrepreneurs did not discriminate against workers, thereby building a good reputation, improving employee performance, and expanding market coverage. In the workplace, discrimination could create an unfair and unproductive environment (Uttam et al., 2022), which deprives certain groups of access to participate and contribute fully to the economy (Uttam et al., 2024).

Digital technology tended to be used by anyone regardless of gender or labor discrimination. The successful use of this technology was attributed to mastery and the willingness to change conventional behavior toward a more modern business. Empowering the surrounding community as workers and suppliers of raw materials could improve the local economy. The use of digital marketing to promote products based on local potential has increasingly made them known to the wider community.

However, limited edition products were not promoted digitally to avoid the risk of design copying by competitors.

4. Conclusion

This study revealed that the covid-19 pandemic led to the closure of several enterprises in Central Java, Indonesia, due to their inability to adapt to changes in consumer behavior and the adoption of digital technology. A total of 75 entrepreneurs, selected based on specific criteria, were chosen to represent business clusters in five selected districts, forming the first group of respondents. Additionally, 10 experts were included in the second group to validate the data obtained from the first group. The findings indicated that the sustainability status of digital-based MSEs was relatively robust from both multidimensional and individual perspectives. The five dimensions of sustainability—economic, environmental, social, institutional, technological, and inclusivity—effectively explained the sustainability of MSEs amidst increasingly competitive business conditions. The integration of digital technology in promoting local potential has led to increased demand for local products in broader markets, generating a multiplier effect that stimulated the local economy and improved community welfare. However, creative businesses offering exclusive products often did not employ digital technology in their marketing efforts. Additionally, the use of child labor within some enterprises violated human rights, hindering children's access to education and broader opportunities. The government's role as a policymaker is crucial in addressing these inclusivity issues through policy formulation, thereby amplifying the positive impact on the MSE environment.

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