Industrial Resilience of Indonesia's Apparel Manufacturing Mses: A Longitudinal Analysis

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ABSTRACT

Micro and Small Enterprises (MSEs) in Indonesia's wearing apparel manufacturing industry play an important role in employment creation and industrial development, yet evidence on their post-pandemic structural transformation remains limited. This study analyses the development of MSEs in KBLI Division 14 during 2020–2024 using nationally representative secondary data published by Statistics Indonesia (BPS). A descriptive quantitative design with a longitudinal approach was employed to examine five structural dimensions: enterprise development, sources of business capital, innovation, business partnerships, and partnership schemes. The findings indicate that the industry's recovery was characterised not only by fluctuations in the number of enterprises but also by significant structural adjustments. Self-financing remained the dominant source of capital, while innovation activities gradually increased, particularly product innovation. Business partnerships expanded after the pandemic, with collaboration primarily focused on raw material supply, operational cooperation, subcontracting, and general trading. These findings suggest that the resilience of apparel manufacturing MSEs has been shaped by the interaction between internal financial resources, incremental innovation, and collaborative business networks rather than by enterprise growth alone. This study contributes to the literature by providing an integrated longitudinal profile of Indonesia's apparel manufacturing sector and offers evidence to support industrial policies aimed at strengthening competitiveness, resilience, innovation, and sustainable development among manufacturing MSEs.

Keywords: Apparel manufacturing, business partnerships, innovation, Micro and Small Enterprises, structural transformation.

INTRODUCTION

Micro and Small Enterprises (MSEs) constitute the largest proportion of manufacturing establishments in Indonesia and continue to play a fundamental role in promoting employment creation, regional economic development, and industrial inclusiveness (Nayak et al., 2022). Within the manufacturing sector, KBLI Division 14 (Wearing Apparel Manufacturing) represents one of the country's most labour-intensive industries, characterised by relatively low barriers to entry, extensive participation of household-based enterprises, and strong linkages with both domestic and export markets. During the period 2020–2024, however, the apparel industry experienced significant structural changes driven by the aftermath of the COVID-19 pandemic, digital transformation in marketing channels, changing consumer preferences towards customised and sustainable products, and increasing competitive pressure from both domestic and imported apparel. These developments have required Micro and Small Enterprises to continuously improve their adaptive capabilities in maintaining business continuity and competitiveness (BPS-Statistics Indonesia, 2025; Maulana et al., 2024).

Contemporary industrial development literature suggests that the sustainability and competitiveness of manufacturing MSEs cannot be explained solely by the growth in the number of business establishments but should also be understood through the interaction of several structural dimensions. From the perspective of the Resource-Based View (RBV), business capital represents a strategic resource that enables enterprises to acquire

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production inputs, improve operational capabilities, and respond to market opportunities (Barney, 1991; Ferreira et al., 2019). Innovation theory further explains that continuous improvements in products, production processes, and marketing activities enhance firms' ability to generate competitive advantage under dynamic market conditions (Ahmad et al., 2022). In addition, network and partnership perspectives argue that collaborative relationships facilitate access to raw materials, technology, market information, financial support, and broader value chains, thereby strengthening enterprise resilience and long-term performance (Humphrey & Schmitz, 2002; OECD, 2023) Collectively, these perspectives indicate that industrial development should be assessed through multiple interconnected dimensions, including business capital, innovation capability, and partnership arrangements, rather than merely the number of enterprises.

Recent scholarship has further expanded this perspective by emphasising that the long-term competitiveness of Micro and Small Enterprises (MSEs) depends not only on the availability of strategic resources but also on their capacity to continuously adapt to industrial transformation through innovation ecosystems and dynamic capabilities. The concept of SME resilience has increasingly been understood as an organisation's ability to anticipate, absorb, and respond to economic disruptions while sustaining business continuity and competitive performance (UNIDO, 2024). Likewise, industrial transformation is no longer viewed solely as structural changes in production activities but as a multidimensional process involving technological adaptation, organisational learning, financial flexibility, and collaborative networks across industrial ecosystems (UNCTAD, 2025) From this perspective, innovation ecosystems facilitate knowledge exchange and resource complementarities among firms, governments, financial institutions, universities, and other stakeholders, thereby strengthening firms' adaptive capacity and innovation performance (Petchenko et al., 2024) These theoretical developments suggest that understanding industrial resilience requires an integrated assessment of enterprise growth, financial structure, innovation behaviour, and partnership dynamics, which collectively provide a more comprehensive explanation of the structural evolution of manufacturing MSEs.

Despite the strategic importance of Indonesia's apparel manufacturing industry, existing studies have predominantly examined issues related to export competitiveness, digital transformation, sustainability, consumer behaviour, and supply-chain management. Comparatively fewer studies have utilised nationally representative official statistics to investigate the structural evolution of Micro and Small Enterprises within KBLI Division 14. More importantly, empirical evidence remains limited regarding how the number of business establishments, sources of business capital, innovation characteristics, partnership participation, and partnership schemes have evolved simultaneously during the post-pandemic recovery period. Since these dimensions collectively reflect enterprise capacity, adaptive capability, and industrial resilience, analysing them in an integrated manner is expected to provide a more comprehensive understanding of the development trajectory of Indonesia's micro and small apparel manufacturing sector (Hidayat et al., 2025; Tambunan, 2019).

The annual publication Profile of Micro and Small Industries issued by Statistics Indonesia (BPS) provides comprehensive and nationally representative statistical information that enables longitudinal assessment of manufacturing industries across Indonesia. Compared with firm-level case studies, this official publication offers consistent data that facilitate the analysis of structural changes over time through indicators such as business population, capital sources, innovation activities, partnership types, and partnership schemes. Nevertheless, the statistical potential of these official publications has rarely been synthesised into sector-specific industrial profiling that comprehensively describes the development of KBLI Division 14 (Wearing Apparel Manufacturing). Consequently, evidence-based understanding of the structural dynamics within this industry remains limited, despite its importance for supporting industrial policy formulation and strengthening the competitiveness of Micro and Small Enterprises.

Against this background, this study aims to analyse the development trends of Micro and Small Enterprises in KBLI Division 14 (Wearing Apparel Manufacturing) in Indonesia during the period 2020–2024 using secondary data published by Statistics Indonesia. Specifically, the study examines five structural dimensions, namely (1) the number of business establishments, (2) sources of business capital, (3) business innovation, (4) types of business partnerships, and (5) partnership schemes by analysing their absolute numbers, proportional distributions, and annual growth rates. The findings are expected to enrich the literature on industrial development by providing a comprehensive statistical profile of Indonesia's apparel manufacturing sector while

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offering evidence-based recommendations for policymakers in designing strategies to improve the competitiveness, resilience, and sustainability of Micro and Small Enterprises.

MATERIALS & METHOD

This study employed a descriptive quantitative research design using a longitudinal approach to analyse the development trends of Micro and Small Enterprises (MSEs) in KBLI Division 14 (Wearing Apparel Manufacturing) in Indonesia during the period 2020–2024. A descriptive approach was selected because the primary objective of the study was not to examine causal relationships between variables but rather to provide a comprehensive statistical profile of the structural characteristics and development patterns of the apparel manufacturing industry over time. Longitudinal analysis allows changes in industrial indicators to be observed across consecutive years, thereby facilitating the identification of growth patterns, structural shifts, and emerging trends within the sector (Fitzsimmons & Fitzsimmons, 2006).

The study relied exclusively on secondary data obtained from the annual publication *Profile of Micro and Small Industries (Profil Industri Mikro dan Kecil)* issued by Statistics Indonesia (Badan Pusat Statistik—BPS). The dataset covered five consecutive years (2020–2024) and represented nationally aggregated statistics for Micro and Small Enterprises operating within KBLI Division 14 (Wearing Apparel Manufacturing). As an official government publication, the BPS dataset provides nationally representative information collected through standardised statistical procedures, making it an appropriate source for longitudinal industrial analysis (BPS-Statistics Indonesia, 2025).

The unit of analysis comprised Micro and Small Enterprises classified under KBLI Division 14, while the analytical dimensions were organised into five principal indicators: (1) the number of business establishments, (2) sources of business capital, (3) business innovation, (4) types of business partnerships, and (5) partnership schemes. Each indicator was analysed using three complementary statistical measures, namely absolute frequency, proportional distribution, and annual growth rate, in order to capture both the structural composition and temporal dynamics of the industry. This multidimensional approach enables a more comprehensive understanding of industrial development than relying solely on changes in the number of enterprises.

The selection of the five structural dimensions was theoretically informed by contemporary perspectives on industrial resilience and enterprise development. Enterprise growth reflects the structural evolution of the industry, while business capital represents the financial resources required to sustain production and organisational continuity. Innovation captures firms' adaptive responses to changing market conditions, whereas business partnerships and partnership schemes represent collaborative mechanisms through which enterprises gain access to external knowledge, markets, resources, and production networks. Rather than examining these indicators independently, this study considers them as complementary dimensions that collectively reflect the adaptive capacity and structural transformation of manufacturing MSEs during the post-pandemic recovery period. Accordingly, the multidimensional framework provides a more comprehensive understanding of industrial development than relying solely on business population statistics.

Data analysis was conducted using descriptive statistical techniques combined with longitudinal trend analysis. First, descriptive statistics were employed to summarise the characteristics of each indicator through frequencies and percentages. Second, time-series trend analysis was performed to examine annual changes in each variable across the observation period. Third, year-on-year (YoY) growth analysis was calculated to identify the magnitude and direction of industrial development between consecutive years. Finally, the analytical results were presented through tables, bar charts, line graphs, and proportional charts to facilitate interpretation of industrial trends and improve the clarity of the descriptive findings. Similar approaches have been widely adopted in industrial profiling and official statistical analyses because they effectively describe structural changes without requiring inferential modelling (OECD, 2023).

The analytical procedure consisted of four sequential stages. The first stage involved identifying relevant variables from the annual BPS publications. The second stage focused on data extraction, verification, and compilation into a unified database covering the 2020–2024 period. The third stage involved calculating frequencies, proportions, and annual growth rates for each analytical indicator. The final stage consisted of

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interpreting the observed trends to explain the structural development of Micro and Small Enterprises within Indonesia's wearing apparel manufacturing sector. By combining official longitudinal statistics with descriptive trend analysis, this study provides an evidence-based industrial profile that can support future industrial policy formulation and strategic development planning.

Although the descriptive longitudinal approach is appropriate for profiling structural developments using nationally aggregated official statistics, several methodological limitations should be acknowledged. The analysis focuses on identifying patterns and trends over time rather than testing causal relationships among business capital, innovation, partnerships, and enterprise performance. Consequently, inferential statistical techniques, such as regression analysis or significance testing, were not employed because the aggregated nature of the BPS dataset does not provide firm-level observations required for causal modelling. Nevertheless, the descriptive approach remains appropriate for achieving the objective of constructing a comprehensive industrial profile based on consistent national statistics. Future studies are encouraged to integrate enterprise-level or regional datasets and employ inferential approaches, including panel-data regression, structural equation modelling, or mixed-method designs, to examine the causal mechanisms underlying industrial resilience and enterprise competitiveness.

RESULT AND DISCUSSION

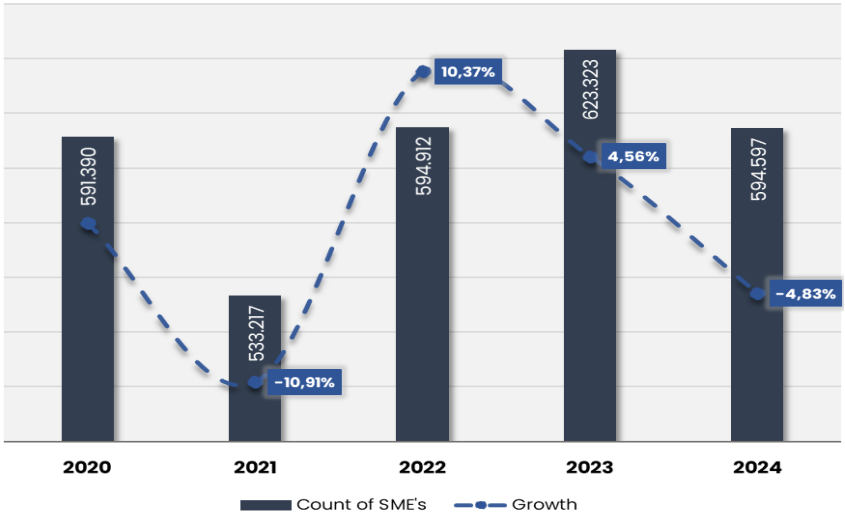
Result

Development of Micro and Small Enterprises in KBLI Division 14 (Wearing Apparel Manufacturing) in Indonesia During 2020–2024

Figure 1 in below, illustrates the development in the number of Micro and Small Enterprises (MSEs) operating in KBLI Division 14 (Wearing Apparel Manufacturing) in Indonesia during the period 2020–2024, together with the corresponding annual growth rates. Overall, the sector experienced a fluctuating trend characterised by a sharp contraction in 2021, a strong recovery during 2022–2023, and a moderate decline in 2024, reflecting the dynamic adjustment of the apparel manufacturing industry following the COVID-19 pandemic.

As shown in Figure 1 in below, the number of MSEs decreased from 591,390 enterprises in 2020 to 532,317 enterprises in 2021, representing a 10.91% decline, the largest contraction during the observation period. This reduction indicates that the pandemic substantially affected the apparel manufacturing sector through declining consumer demand, disruptions in production activities, and weakened market access. Given the labour-intensive nature of the industry and its dominance by micro-scale enterprises, many businesses experienced operational constraints that reduced their production capacity and business continuity (UNIDO, 2022).

Figure 1. Number of Micro and Small Enterprises and Annual Growth in KBLI Division 14 (Wearing Apparel Manufacturing) in Indonesia, 2020–2024



Source: Data Processed (2026)

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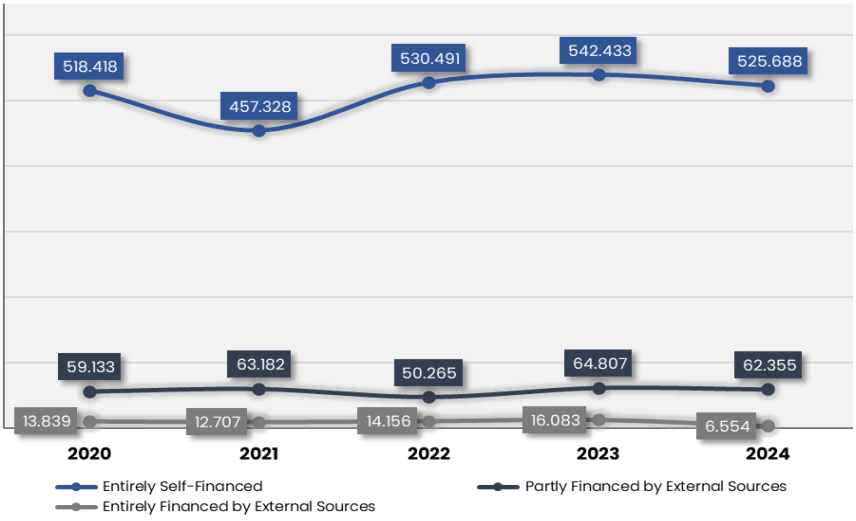
The sector recovered considerably in 2022, with the number of enterprises increasing to 594,912, equivalent to an annual growth of 10.37%. Growth continued in 2023, reaching 623,323 enterprises, the highest level during the study period, although the annual growth rate moderated to 4.56%. This trend suggests that the recovery phase gradually shifted towards a more stable expansion, supported by improving domestic economic conditions, stronger consumer demand, and wider utilisation of digital marketing and electronic commerce by small businesses (OECD, 2023). In 2024, however, the number of enterprises declined to 594,597, corresponding to a 4.83% decrease compared with the previous year. Although less severe than the contraction recorded in 2021, this decline indicates that the industry's recovery remained vulnerable to structural challenges, including increasing production costs, stronger market competition, and changing consumer preferences. Nevertheless, the total number of enterprises remained broadly comparable to the pre-pandemic level, suggesting that the apparel manufacturing sector maintained a relatively resilient industrial base despite continuing market adjustments (Tambunan, 2019).

Overall, Figure 1 demonstrates that the development of MSEs in KBLI Division 14 followed a cyclical pattern of contraction, recovery, expansion, and adjustment. These findings indicate that fluctuations in business population should not be interpreted solely as changes in the number of enterprises but also as evidence of ongoing structural transformation within Indonesia's apparel manufacturing industry. Consequently, further analysis of business capital, innovation, and partnership characteristics is required to obtain a more comprehensive understanding of the sector's development.

Sources of Business Capital among Micro and Small Enterprises in KBLI Division 14 (Wearing Apparel Manufacturing)

Figure 2 presents the distribution of business capital sources among Micro and Small Enterprises (MSEs) in KBLI Division 14 (Wearing Apparel Manufacturing) during 2020–2024, while Table 1 summarises the corresponding annual growth rates. Overall, the results indicate that the apparel manufacturing sector remained overwhelmingly dependent on self-financing, whereas enterprises relying partly or entirely on external financial sources represented only a relatively small proportion of the industry throughout the observation period.

Figure 2. Sources of Business Capital among Micro and Small Enterprises in KBLI Division 14 (Wearing Apparel Manufacturing), 2020–2024



Source: Data Processed (2026)

As illustrated in Figure 2, enterprises financed entirely through their own capital consistently dominated the sector, accounting for more than 450,000 establishments annually. The number declined from 518,418 enterprises in 2020 to 457,328 in 2021, representing a contraction of 13.4% (Table 1). This decrease coincided with the economic disruption caused by the COVID-19 pandemic, during which many micro and small manufacturers experienced declining revenues and limited financial capacity to sustain production. Nevertheless, self-financed enterprises recovered substantially in 2022 with an annual growth of 13.8%, followed by more

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moderate increases in 2023 (2.2%) before experiencing a slight decline of 3.2% in 2024. Despite these fluctuations, the consistently large number of self-financed enterprises demonstrates that internal capital remained the principal financial foundation of Indonesia's apparel manufacturing MSEs.

By comparison, enterprises that were partly financed by external sources represented a much smaller segment of the industry. As shown in Figure 2, the number fluctuated between 50,265 and 64,807 enterprises, indicating a relatively stable but limited utilisation of mixed financing arrangements. According to Table 1, this category experienced positive growth during 2020–2021 (6.4%), followed by a substantial decline in 2021–2022 (–25.7%) before rebounding by 22.4% in 2022–2023. These fluctuations suggest that external financial support was primarily utilised as a complementary source of capital rather than a permanent financing strategy, particularly during periods of economic adjustment.

Table 1. Annual Growth of Business Capital Sources among Micro and Small Enterprises in KBLI Division 14 (Wearing Apparel Manufacturing), 2020–2024

Year	Entirely Self-Financed	Partly Financed by External Sources	Entirely Financed by External Sources
2020-2021	-13,4%	6,4%	-8,9%
2021-2022	13,8%	-25,7%	10,2%
2022-2023	2,2%	22,4%	12,0%
2023-2024	-3,2%	-3,9%	-145,4%

Source: Data Processed (2026)

The smallest category consisted of enterprises entirely financed by external sources, with annual totals remaining below 17,000 enterprises throughout the study period (Figure 2). Although this category recorded modest growth between 2021 and 2023, the sharp decline observed in 2024 reflects the continued rarity of businesses operating solely through external financing. This finding implies that complete dependence on borrowed or third-party capital remains uncommon among micro and small apparel manufacturers, possibly due to limited access to formal financial institutions or entrepreneurs' preference for maintaining financial independence (World Bank, 2024).

Overall, the findings from Figure 2 and Table 1 indicate that the financial structure of KBLI Division 14 continues to be characterised by a strong reliance on self-financing, while external capital plays a supplementary rather than dominant role. The persistence of this financing pattern suggests that although the sector demonstrated resilience during the post-pandemic recovery, expanding access to diverse financing sources remains an important consideration for strengthening the long-term growth and competitiveness of Indonesia's micro and small apparel industry (Fatoki, 2021).

Business Innovation among Micro and Small Enterprises in KBLI Division 14 (Wearing Apparel Manufacturing)

Figures 3 and 4, together with Table 2, present the innovation characteristics of Micro and Small Enterprises (MSEs) operating in KBLI Division 14 (Wearing Apparel Manufacturing) during the period 2020–2024. The results indicate that although most enterprises had not yet undertaken innovation activities, the number of innovative businesses increased steadily throughout the observation period. At the same time, product innovation consistently remained the dominant form of innovation, while technology- and process-oriented innovations were implemented by a relatively smaller proportion of enterprises.

As illustrated in Figure 3, enterprises that did not undertake innovation consistently outnumbered innovative firms during the five-year period. The number of non-innovative enterprises declined from 565,142 in 2020 to 462,968 in 2024, whereas enterprises undertaking innovation increased substantially from 26,248 to 131,629

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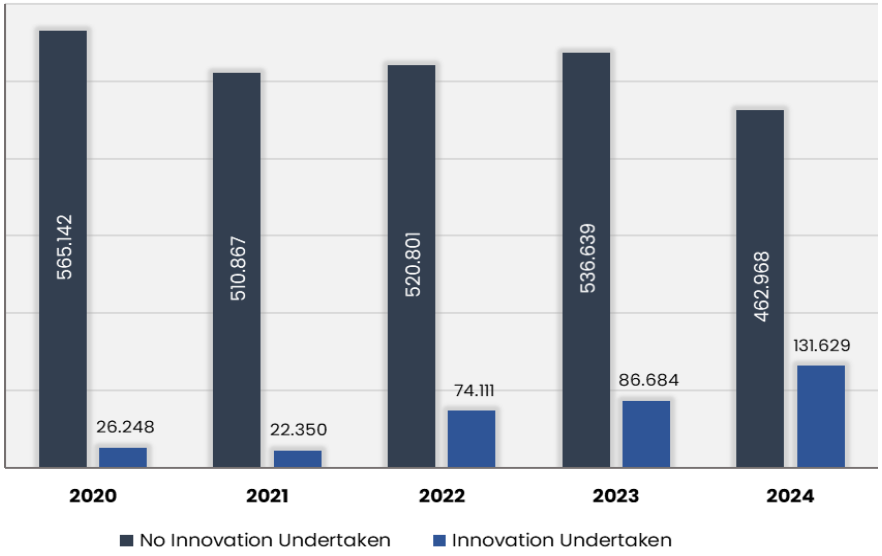
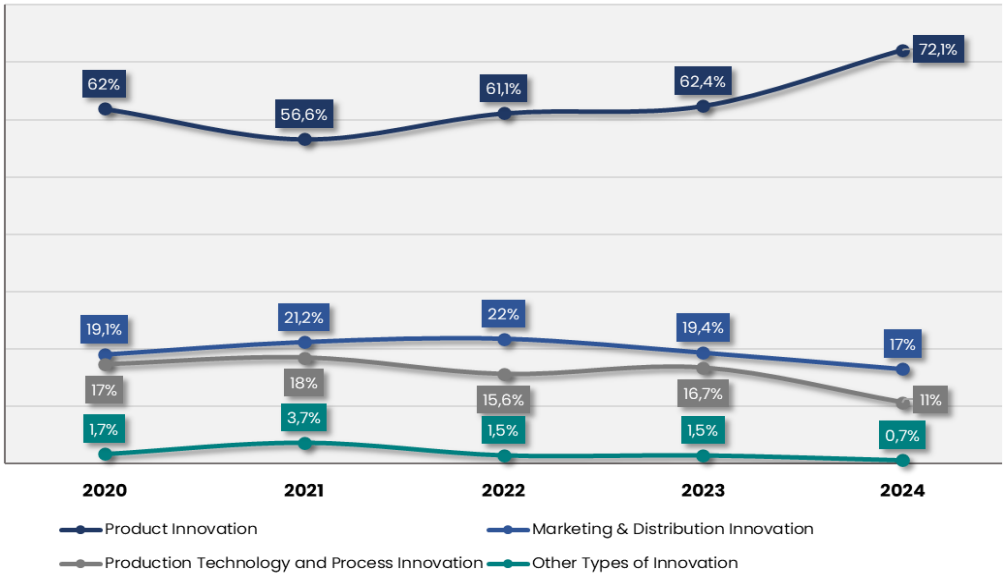
over the same period. This pattern indicates a gradual improvement in innovation adoption among apparel manufacturing MSEs despite innovation activities remaining concentrated within a relatively limited segment of the industry. The increasing number of innovative enterprises suggests that manufacturers became more responsive to changing market conditions and competitive pressures during the post-pandemic recovery period.

Figure 3. Number of Micro and Small Enterprises Undertaking Innovation in KBLI Division 14 (Wearing Apparel Manufacturing), 2020–2024



Source: Data Processed (2026)

Figure 4. Distribution of Micro and Small Enterprises by Type of Innovation in KBLI Division 14 (Wearing Apparel Manufacturing), 2020–2024



Source: Data Processed (2026)

Annual growth rates reported in Table 2 further demonstrate that innovation activities evolved differently across innovation categories. Product innovation experienced substantial growth during 2021–2022 (70.5%) and continued to increase in subsequent years, while marketing and distribution innovation also recorded strong expansion during the same period (69.0%). Technology and process innovation grew considerably until 2023, before declining by 9.3% in 2024. In contrast, other forms of innovation showed the highest volatility, culminating in a sharp decrease of 61.8% during 2023–2024. Overall, these results indicate that innovation within Indonesia's apparel manufacturing MSEs has become increasingly concentrated on product development

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and market-oriented improvements, whereas innovation beyond core business activities remains relatively limited. Such patterns reflect the tendency of micro and small enterprises to prioritise innovations requiring lower investment and shorter implementation periods, particularly under conditions of limited financial and technological resources (Distanont & Khongmalai, 2018).

Table 2. Annual Growth of Innovation Types among Micro and Small Enterprises in KBLI Division 14 (Wearing Apparel Manufacturing), 2020–2024

Year	Product Innovation	Marketing & Distribution Innovation	Production Technology and Process Innovation	Other Types of Innovation
2020-2021	-19,4%	1,8%	-2,2%	48,9%
2021-2022	70,5%	69,0%	62,3%	22,6%
2022-2023	14%	1,3%	18,0%	11,5%
2023-2024	39,6%	18,3%	-9,3%	-61,8%

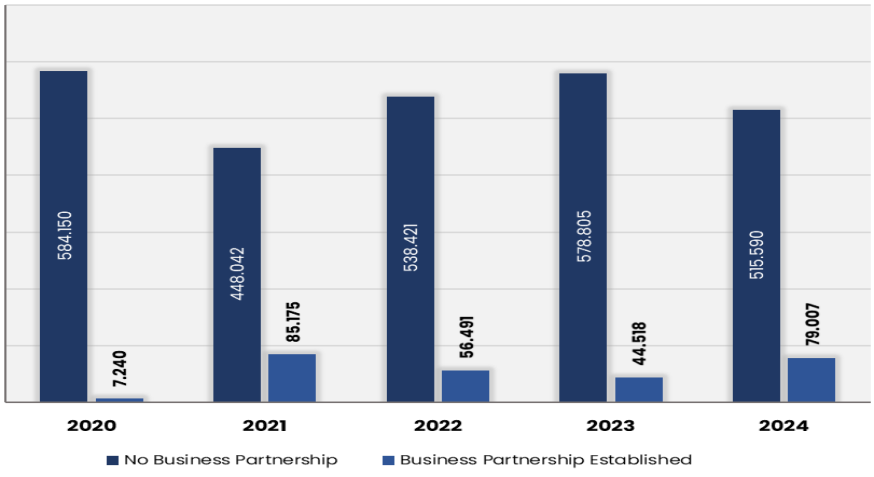
Source: Data Processed (2026)

Overall, the findings from Figure 3, Figure 4, and Table 2 demonstrate a gradual strengthening of innovation activities within KBLI Division 14 during 2020–2024. Although innovation participation continued to involve only a minority of enterprises, the increasing emphasis on product innovation indicates an adaptive response to changing consumer preferences and intensifying market competition within Indonesia's apparel manufacturing industry.

Types of Business Partnerships among Micro and Small Enterprises in KBLI Division 14 (Wearing Apparel Manufacturing)

Figure 5, Figure 6, and Table 3 present the characteristics of business partnerships among Micro and Small Enterprises (MSEs) in KBLI Division 14 (Wearing Apparel Manufacturing) during the period 2020–2024. Overall, the findings indicate that most enterprises continued to operate without formal business partnerships, although the number of enterprises participating in partnerships increased considerably following the pandemic. Among those establishing partnerships, raw material supply consistently represented the dominant form of collaboration, followed by marketing support, while partnerships related to capital goods and other forms of support remained relatively limited.

Figure 5. Number of Micro and Small Enterprises Engaged in Business Partnerships in KBLI Division 14 (Wearing Apparel Manufacturing), 2020–2024



Source: Data Processed (2026)

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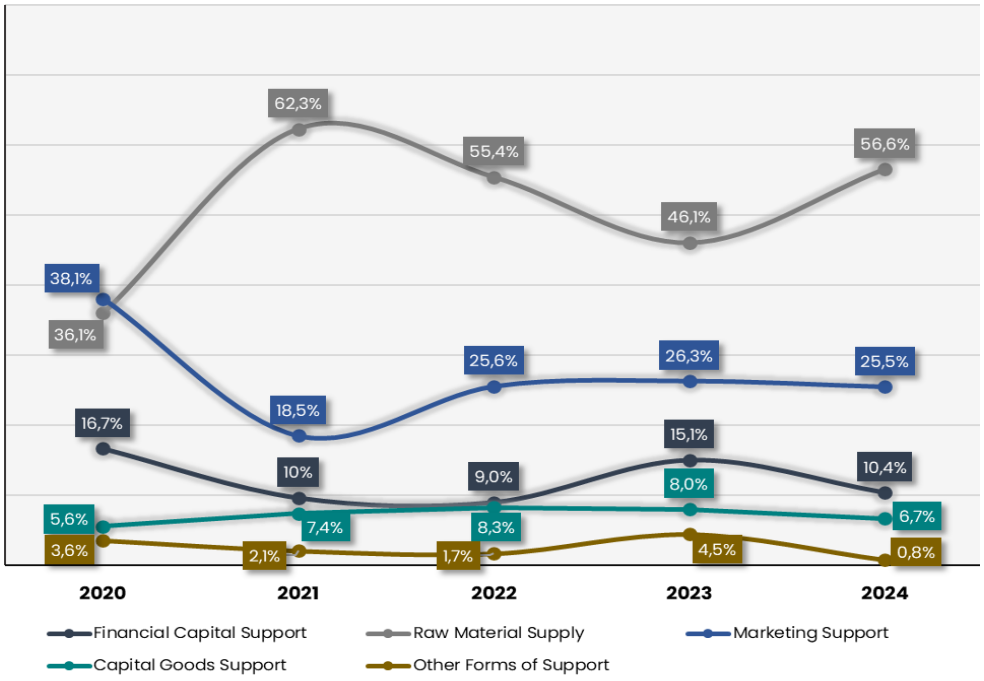
As illustrated in Figure 5, enterprises without business partnerships substantially outnumbered those with formal collaborative arrangements throughout the study period. The number of non-partnered enterprises declined from 584,150 in 2020 to 448,042 in 2021, before recovering to 578,805 in 2023 and slightly decreasing to 515,590 in 2024. Conversely, enterprises establishing business partnerships increased markedly from only 7,240 enterprises in 2020 to 85,175 enterprises in 2021, although the figure subsequently fluctuated between 44,518 and 79,007 enterprises. These results suggest that formal partnerships became more widely adopted during the post-pandemic period, despite remaining limited relative to the overall business population. Such collaboration is increasingly recognised as an important mechanism for improving business resilience and market integration among small manufacturing enterprises (OECD-UNIDO, 2019).

The distribution of partnership types is presented in Figure 6. Raw material supply partnerships consistently accounted for the largest proportion, increasing sharply from 36.0% in 2020 to 62.3% in 2021, before stabilising at 56.6% in 2024. Marketing support represented the second-largest category, fluctuating between 18.5% and 38.3%, while financial capital support remained relatively stable within the range of 9–17%. Partnerships involving capital goods support contributed approximately 6–8%, whereas other forms of support consistently represented the smallest proportion, remaining below 5% throughout the observation period. These findings indicate that collaboration among apparel manufacturing MSEs was primarily directed towards securing production inputs and expanding market access rather than acquiring production assets or broader institutional support.

Figure 6. Distribution of Micro and Small Enterprises by Type of Business Partnership in KBLI Division 14 (Wearing Apparel Manufacturing), 2020–2024



Source: Data Processed (2026)

The annual growth rates reported in Table 3 further reveal considerable variation among partnership categories. During 2020–2021, all partnership types experienced substantial positive growth, particularly raw material supply (93.5%), capital goods support (91.6%), and financial capital support (80.6%). However, several categories contracted during 2021–2022, especially raw material supply (–67.4%) and financial capital support (–59.0%), before recovering in the following years. Marketing support recorded a notable increase of 37.3% in 2023–2024, whereas other forms of support declined sharply by 243.0% over the same period. These fluctuations indicate that partnership arrangements remained responsive to changing business conditions, with enterprises prioritising collaborative activities directly related to production continuity and market expansion (Kringelum & Frederiksen, 2026).

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Table 3. Annual Growth of Business Partnership Types among Micro and Small Enterprises in KBLI Division 14 (Wearing Apparel Manufacturing), 2020–2024

Year	Financial Capital Support	Raw Material Supply	Marketing Support	Capital Goods Support	Other Forms of Support
2020-2021	80,6%	93,5%	77%	91,6%	80,8%
2021-2022	-59,0%	-67,4%	-7,9%	-33,4%	-82,7%
2022-2023	31%	-39,5%	-12,6%	-19%	55,7%
2023-2024	12%	50,5%	37,3%	27,3%	-243,0%

Source: Data Processed (2026)

Overall, the results from Figure 5, Figure 6, and Table 3 demonstrate that although formal business partnerships have become increasingly important within KBLI Division 14, collaboration among apparel manufacturing MSEs continues to concentrate on operational aspects, particularly raw material procurement and marketing. This pattern suggests that partnerships are primarily utilised to strengthen short-term business operations, while broader strategic collaboration remains relatively underdeveloped.

Partnership Schemes among Micro and Small Enterprises in KBLI Division 14 (Wearing Apparel Manufacturing)

Table 4 and Table 5 present the distribution and annual growth of partnership schemes adopted by Micro and Small Enterprises (MSEs) in KBLI Division 14 (Wearing Apparel Manufacturing) during 2020–2024. The results reveal considerable variation in the utilisation of different partnership schemes over time. While several partnership models experienced substantial expansion following the pandemic, others remained limited or displayed considerable fluctuations, indicating that collaborative arrangements among apparel manufacturing MSEs continue to evolve in response to changing business conditions.

Table 4. Number of Micro and Small Enterprises by Partnership Scheme in KBLI Division 14 (Wearing Apparel Manufacturing), 2020–2024

Year	Nucleus–Plasma Scheme	Subcontracting	General Trading	Profit-Sharing Arrangement	Operational Cooperation	Joint Venture	Other Partnership Schemes
2020	747	1.005	1.988	789	3.014	108	1.052
2021	23.073	6.908	10.678	7.284	26.087	634	1.745
2022	4.141	6.101	10.140	4.121	27.611	807	8.624
2023	1.994	6.172	14.688	3.574	13.470	979	8.815
2024	7.851	21.614	23.432	3.706	21.939	963	6.200

Source: Data Processed (2026)

As presented in Table 4, operational cooperation and general trading consistently represented the most widely adopted partnership schemes throughout the study period. Operational cooperation increased from 3,014 enterprises in 2020 to 27,611 enterprises in 2022, before stabilising at 21,939 enterprises in 2024. Likewise, general trading partnerships expanded steadily from 1,988 enterprises in 2020 to 23,432 enterprises in 2024,

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becoming the largest partnership scheme by the end of the observation period. In comparison, subcontracting also demonstrated notable growth, particularly in 2024, whereas joint ventures remained the least utilised partnership model, involving fewer than 1,000 enterprises throughout the five-year period. These findings indicate that apparel manufacturing MSEs tend to favour partnership schemes that directly facilitate production activities and market transactions rather than more formal investment-based collaborations.

Table 5. Annual Growth of Micro and Small Enterprises by Partnership Scheme in KBLI Division 14 (Wearing Apparel Manufacturing), 2020–2024

Year	Nucleus–Plasma Scheme	Subcontracting	General Trading	Profit-Sharing Arrangement	Operational Cooperation	Joint Venture	Other Partnership Schemes
2020-2021	96,8%	85,5%	81,4%	89,2%	88,4%	83,0%	39,7%
2021-2022	-457,2%	-13,2%	-5,3%	-76,8%	5,5%	21,4%	79,8%
2022-2023	-107,7%	1,2%	31,0%	-15,3%	-105,0%	17,6%	2,2%
2023-2024	74,6%	71,4%	37,3%	3,6%	38,6%	-1,7%	-42,2%

Source: Data Processed (2026)

The annual growth rates presented in Table 5 further demonstrate the dynamic nature of partnership schemes across the observation period. During 2020–2021, all partnership models experienced strong positive growth, particularly the Nucleus–Plasma Scheme (96.8%), Profit-Sharing Arrangements (89.2%), and Operational Cooperation (88.4%). However, substantial contractions were observed in 2021–2022, especially for the Nucleus–Plasma Scheme (–457.2%), reflecting a sharp adjustment following the exceptional increase recorded during the previous year. Growth became more moderate in subsequent years, with general trading and subcontracting recording consistent expansion, while operational cooperation rebounded by 38.6% in 2023–2024. Conversely, other partnership schemes declined considerably during the same period (–42.2%), suggesting that enterprises increasingly concentrated their collaboration on partnership models offering more direct commercial and operational benefits.

Overall, the findings from Table 4 and Table 5 indicate that partnership schemes among MSEs in KBLI Division 14 have gradually shifted towards more market-oriented forms of collaboration. The increasing prominence of general trading, subcontracting, and operational cooperation suggests that apparel manufacturers prioritise partnership arrangements capable of strengthening supply-chain integration, improving production continuity, and expanding market access. Meanwhile, more formal collaborative models, such as joint ventures and nucleus–plasma partnerships, remain relatively limited within Indonesia's micro and small apparel manufacturing sector. This pattern reflects the practical preference of small enterprises for flexible and less resource-intensive partnership arrangements that can be implemented within their operational capacity (Humphrey & Schmitz, 2002).

DISCUSSION

The findings demonstrate that the post-pandemic development of Micro and Small Enterprises (MSEs) in Indonesia's KBLI Division 14 (Wearing Apparel Manufacturing) cannot be adequately understood through changes in the number of enterprises alone. Instead, the results reveal that business recovery was accompanied by simultaneous structural adjustments in financing patterns, innovation behaviour, business partnerships, and partnership schemes, indicating that enterprise resilience is multidimensional rather than solely growth-oriented.

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This evidence addresses the research gap identified in previous studies, which have predominantly examined isolated aspects of the apparel industry—such as export performance, digitalisation, or consumer behaviour—while providing limited understanding of how multiple structural dimensions evolve concurrently during industrial recovery. The present study therefore extends existing knowledge by presenting an integrated longitudinal profile based on nationally representative statistics, enabling a more comprehensive interpretation of the adaptive capacity of Indonesia's apparel manufacturing MSEs (Hidayat et al., 2025; OECD, 2023).

From a theoretical perspective, the overall findings support the argument that industrial resilience emerges from the interaction between internal resources, innovation capability, and collaborative networks rather than from individual organisational attributes alone. The continued dominance of self-financed enterprises, the gradual increase in innovation activities, and the growing utilisation of operational partnerships collectively suggest that apparel manufacturers have primarily relied on incremental adaptation to maintain competitiveness under uncertain market conditions. These patterns are broadly consistent with the Dynamic Capabilities perspective, which emphasises firms' ability to continuously reconfigure internal and external resources in response to environmental change, as well as contemporary studies highlighting that long-term competitiveness among manufacturing SMEs increasingly depends upon the integration of financial flexibility, innovation, and inter-firm collaboration rather than isolated strategic initiatives (Maloney et al., 2025; Teece, 2018).

Industrial Recovery and Structural Transformation of KBLI Division 14

The findings suggest that the post-pandemic trajectory of Indonesia's KBLI Division 14 reflects a process of structural transformation rather than a simple recovery in business numbers. Although the apparel manufacturing sector gradually regained its productive capacity, the evidence indicates that enterprises simultaneously adjusted their financial behaviour, innovation orientation, and collaborative strategies in response to a more uncertain competitive environment. This multidimensional adjustment demonstrates that industrial recovery among Micro and Small Enterprises (MSEs) should be understood as the reconfiguration of organisational resources and business capabilities instead of merely the restoration of pre-pandemic production levels. Such an interpretation is consistent with the Dynamic Capability perspective, which argues that firms sustain competitiveness by continuously sensing environmental changes, seizing emerging opportunities, and transforming organisational resources to accommodate new market realities (Teece, 2018).

From the perspective of the Resource-Based View (RBV), the continued predominance of internally generated capital alongside the gradual expansion of innovation activities indicates that the resilience of apparel manufacturers primarily originated from firm-specific resources accumulated over time. Rather than relying heavily on external financing, many enterprises appeared to strengthen their competitiveness through incremental improvements in products and operational efficiency while maintaining financial flexibility. This pattern reflects the strategic behaviour of resource-constrained SMEs, where limited access to capital encourages the optimisation of existing capabilities before pursuing large-scale investments. Similar tendencies have been identified across manufacturing SMEs in developing economies, where organisational resilience is closely associated with the effective mobilisation of internal resources combined with gradual innovation and adaptive managerial practices (Calabrò et al., 2021; Kraus et al., 2022).

The results further indicate that structural transformation extended beyond firm-level capabilities towards the development of collaborative business ecosystems. The increasing utilisation of operational partnerships, trading relationships, and subcontracting arrangements suggests that enterprises increasingly recognised inter-firm collaboration as a mechanism for reducing uncertainty, securing supply-chain continuity, and expanding market access. This observation supports Network Theory, which proposes that firms embedded within stronger collaborative networks obtain superior access to information, complementary resources, and market opportunities compared with isolated enterprises. Collectively, these findings imply that the recovery of Indonesia's apparel manufacturing industry was driven not by a single strategic factor but by the interaction between internal resources, adaptive innovation, and collaborative networks, reinforcing the concept of industrial resilience as an evolving capability to absorb shocks while simultaneously restructuring business models in response to long-term environmental change (Belso-Martinez et al., 2013; Czakon et al., 2023).

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The structural transformation identified in this study is also consistent with evidence reported in Indonesia and other developing economies. Recent studies indicate that post-pandemic recovery among Indonesian MSMEs has largely been driven by gradual business adaptation, organisational resilience, and continuous innovation rather than rapid structural expansion. Likewise, evidence from manufacturing firms in Indonesia, Malaysia, and Vietnam demonstrates that incremental innovation and adaptive organisational capabilities contribute more consistently to firm performance than large-scale technological transformation, particularly among resource-constrained enterprises. Similar observations have also been reported across ASEAN manufacturing sectors, where firms have strengthened resilience through gradual capability development, production flexibility, and supply-chain adaptation under increasingly uncertain business environments. These similarities suggest that the structural transformation observed among Indonesia's apparel manufacturing MSEs reflects a broader adaptive pattern commonly experienced by manufacturing SMEs across developing economies rather than an isolated national phenomenon (Pusparini et al., 2026).

Financial Structure and Capital Dependency

The financial structure of Indonesia's KBLI Division 14 indicates that business continuity has largely been sustained through internally generated resources rather than extensive reliance on external finance. This financing pattern reflects more than a preference for financial independence; it illustrates the strategic behaviour of micro and small enterprises operating under persistent financial constraints. From the perspective of the Resource-Based View (RBV), internally accumulated capital represents a valuable strategic asset that enables firms to preserve operational flexibility and maintain production despite uncertain market conditions. Nevertheless, while internal financing contributes to organisational resilience in the short term, excessive dependence on self-financing may simultaneously constrain firms' capacity to undertake technological upgrading, expand production scale, and respond rapidly to emerging market opportunities. Similar evidence has been reported among manufacturing SMEs in emerging economies, where restricted access to external finance often limits firms' long-term productivity growth and competitive transformation (Brixiová et al., 2020; Demirgüç-Kunt et al., 2022).

Viewed through the lens of Dynamic Capability Theory, financial resources should not be interpreted solely as production inputs but as enablers of organisational adaptation. The gradual expansion of innovation activities observed alongside the persistence of internally financed enterprises suggests that many apparel manufacturers prioritised incremental and low-risk innovations compatible with their available financial capacity. Consequently, product improvements and market-oriented adjustments became more prevalent than capital-intensive investments in production technology or organisational restructuring. This pattern supports Innovation Theory, which argues that SMEs frequently pursue incremental innovation when financial resources are limited, enabling firms to remain competitive while minimising investment risk. Recent international studies similarly conclude that financial flexibility substantially influences firms' ability to absorb external shocks and continuously renew their innovation capabilities under uncertain economic conditions (Clauss et al., 2021; Filser et al., 2023).

The findings further suggest that financial limitations have strengthened the strategic importance of collaborative relationships within the apparel manufacturing industry. Enterprises experiencing limited financial capacity increasingly rely on business partnerships, subcontracting, and commercial cooperation to obtain complementary resources that cannot easily be financed internally. Such behaviour aligns with Network Theory, which emphasises that inter-organisational relationships enable firms to compensate for resource deficiencies by accessing external knowledge, technology, suppliers, and markets. Therefore, the persistent dependence on internal capital should not necessarily be interpreted as financial weakness but rather as part of a broader adaptive strategy in which financial discipline, incremental innovation, and collaborative networks collectively reinforce industrial resilience. This integrated perspective demonstrates that the long-term competitiveness of KBLI Division 14 depends not only on expanding access to finance but equally on strengthening the institutional ecosystem that supports innovation diffusion and strategic partnerships among manufacturing SMEs (Gao et al., 2026; van der Vegt et al., 2015).

Comparable evidence has also been reported across developing economies, where internally generated capital continues to dominate SME financing despite expanding public financial support programmes. Studies

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conducted in Indonesia reveal that limited access to formal financial institutions remains a persistent constraint, encouraging manufacturing SMEs to depend primarily on retained earnings and household resources. Similar financing behaviour has been documented in Malaysia and Vietnam, where internal financing provides operational flexibility but simultaneously limits firms' capacity to undertake technological upgrading and business expansion. Consequently, the financial structure identified in this study reflects broader characteristics of manufacturing SMEs operating under institutional and financial constraints commonly found across emerging economies (Lestari et al., 2024).

Innovation Behaviour and Competitiveness

The innovation behaviour observed within Indonesia's KBLI Division 14 suggests that competitiveness among apparel manufacturing MSEs is increasingly shaped by adaptive rather than disruptive innovation. Instead of pursuing radical technological transformation, firms appear to prioritise innovations that can be implemented within existing organisational and financial capacities, particularly those directly responding to evolving customer preferences and market demand. Such behaviour reflects the typical innovation pathway of resource-constrained manufacturing SMEs, where innovation is viewed as a continuous learning process rather than a one-off technological breakthrough. From the perspective of Innovation Theory, this gradual accumulation of innovation capabilities enables firms to improve competitiveness despite operating under limited financial and technological resources. Similar observations have been reported in recent international studies, which argue that incremental innovation often provides more sustainable competitive advantages for SMEs than high-risk technological investments because it allows continuous adaptation without imposing excessive financial pressure (Rauter et al., 2019; Roper & Turner, 2020).

The findings also reinforce the complementary relationship between financial capability, organisational learning, and innovation performance. As discussed in the previous subsection, the predominance of internally financed enterprises has encouraged firms to allocate resources selectively towards innovation activities capable of generating immediate commercial value. This pattern illustrates the Dynamic Capability argument that firms continuously reconfigure available resources according to changing environmental conditions instead of simply increasing investment expenditure. From the Resource-Based View (RBV), innovation capability itself gradually becomes an intangible strategic resource that is difficult for competitors to replicate because it develops through accumulated experience, managerial learning, and market interaction. Consequently, competitiveness in the apparel manufacturing industry appears to depend not only on the availability of financial capital but also on the firm's ability to transform limited resources into market-responsive innovations through effective organisational capabilities (Audretsch et al., 2021; O’Connor & Audretsch, 2023).

Beyond the firm level, innovation behaviour also appears closely associated with collaborative relationships established across the industrial ecosystem. Access to suppliers, customers, subcontracting arrangements, and operational partnerships potentially facilitates knowledge exchange, product development, and market intelligence that individual enterprises would struggle to generate independently. This observation supports Network Theory, which emphasises that innovation increasingly emerges through interaction among interconnected actors rather than through isolated organisational efforts. Accordingly, strengthening innovation capability within KBLI Division 14 requires not only greater financial support but also stronger innovation networks involving government institutions, universities, industry associations, and private-sector partners. Such collaborative ecosystems are widely recognised as critical foundations for enhancing industrial resilience and sustaining SME competitiveness in increasingly volatile manufacturing environments (Bogers et al., 2018).

The innovation behaviour identified in this study is likewise consistent with empirical evidence from Indonesia and other Southeast Asian emerging economies. Previous studies demonstrate that manufacturing firms in Indonesia, Malaysia, and Vietnam achieve stronger business performance primarily through product innovation, whereas more capital-intensive technological innovation tends to generate slower returns, particularly among firms operating under financial constraints. Furthermore, recent evidence from Indonesian SMEs highlights that organisational resilience and innovation capability mutually reinforce long-term competitiveness during periods of environmental uncertainty. These findings suggest that the emphasis on product-oriented innovation observed among Indonesia's apparel manufacturing MSEs reflects a broader developmental trajectory commonly experienced by manufacturing SMEs across developing countries (Na & Kang, 2019).

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Partnership as a Mechanism for Industrial Resilience

The findings indicate that business partnerships within Indonesia's KBLI Division 14 should be interpreted as adaptive mechanisms that enhance organisational resilience rather than merely as contractual business arrangements. The increasing orientation towards operational cooperation, commercial relationships, and supply-chain collaboration suggests that apparel manufacturing MSEs have increasingly relied on external networks to compensate for limitations in financial resources, technological capabilities, and market access. This pattern reflects a shift from firm-centred competitiveness towards ecosystem-based competitiveness, where resilience is strengthened through resource sharing and collaborative problem-solving among interconnected actors. Such evidence aligns with Network Theory, which argues that firms embedded within dense collaborative networks are better positioned to acquire complementary resources, exchange knowledge, and respond more effectively to environmental uncertainty than firms operating in isolation (Borgatti & Halgin, 2011; Granovetter, 1985).

The role of partnerships also complements the interaction between internal resources and innovation capability discussed in the previous sections. From the Resource-Based View (RBV), enterprises with constrained internal resources may extend their strategic resource base by accessing external assets through collaborative relationships. Simultaneously, the Dynamic Capability perspective suggests that partnerships enable firms to continuously sense market changes, integrate external knowledge, and reconfigure organisational capabilities without relying exclusively on internal investment. Consequently, partnerships not only facilitate production continuity but also accelerate organisational learning, innovation diffusion, and market responsiveness. Recent studies increasingly recognise that SMEs demonstrating stronger collaborative capabilities are generally more resilient during periods of economic disruption because partnerships reduce operational uncertainty while expanding opportunities for innovation and value creation (Czakon et al., 2023; Lopez et al., 2024).

More broadly, the partnership patterns observed in this study highlight the importance of institutional collaboration in supporting the long-term transformation of Indonesia's apparel manufacturing industry. Although many enterprises continue to depend primarily on internal resources, the growing role of operational and market-oriented partnerships indicates that resilience is progressively becoming a collective rather than an individual organisational capability. Strengthening collaboration among enterprises, suppliers, financial institutions, universities, business associations, and government agencies would therefore enhance innovation diffusion, facilitate technology adoption, and improve access to broader value chains. This interpretation supports the contemporary concept of industrial resilience, which emphasises that sustainable competitiveness is achieved not only through firm-level capabilities but also through the strength of interconnected industrial ecosystems capable of collectively adapting to structural economic change (Ahmad et al., 2022; Ketels, 2013).

Evidence from Indonesia and other developing countries likewise highlights the strategic importance of collaborative partnerships in strengthening SME resilience and industrial competitiveness. Studies have shown that enterprises participating in collaborative innovation ecosystems, production networks, and institutional partnerships generally demonstrate stronger adaptive capacity and innovation performance than firms operating independently. Similar experiences across ASEAN manufacturing industries further indicate that stronger regional production networks, supplier collaboration, and institutional support contribute substantially to industrial resilience by facilitating knowledge diffusion, supply-chain integration, and market expansion. Therefore, the partnership patterns identified in this study reinforce broader evidence that collaborative business ecosystems constitute a fundamental mechanism for strengthening manufacturing resilience in developing economies (Soeprapto et al., 2026).

Policy and Managerial Implications

The findings imply that future industrial policies for Indonesia's apparel manufacturing MSEs should move beyond conventional financial assistance and adopt a more integrated capability-development approach. While improving access to finance remains important, the results suggest that financial resources alone are insufficient to strengthen long-term competitiveness if they are not accompanied by support for innovation, managerial capability, and collaborative business networks. From the perspectives of the Resource-Based View and Dynamic Capability Theory, sustainable industrial development depends on strengthening firms' capacity to

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combine financial resources with organisational learning, technological adaptation, and strategic decision-making. Consequently, industrial policies should prioritise integrated programmes that simultaneously enhance entrepreneurial capabilities, innovation readiness, digital transformation, and inter-firm collaboration rather than implementing isolated interventions focused solely on capital provision. Recent international policy discussions similarly emphasise that capability-oriented industrial policies generate more sustainable productivity improvements than financial support alone (OECD, 2023; World Economic Forum, 2024).

From a managerial perspective, the findings indicate that apparel manufacturing SMEs should increasingly view innovation and collaboration as complementary strategic investments rather than independent business activities. Managers need to strengthen internal learning mechanisms, continuously monitor changing consumer preferences, and utilise collaborative partnerships to access knowledge, technology, and new market opportunities that may be unattainable through internal resources alone. This approach reflects the principles of Dynamic Capability and Network Theory, whereby competitive advantage is created through the continuous integration of internal capabilities with external strategic relationships. Accordingly, strengthening managerial competence in innovation management, digital marketing, supply-chain coordination, and partnership development should become a strategic priority for enterprise sustainability in an increasingly competitive manufacturing environment (George et al., 2021; Nambisan et al., 2017).

More broadly, the results highlight the importance of developing an innovation-oriented industrial ecosystem that connects government agencies, financial institutions, universities, technology providers, industry associations, and private-sector partners. Such an ecosystem would facilitate knowledge transfer, technology diffusion, market integration, and broader access to financing, thereby reducing structural constraints commonly experienced by manufacturing SMEs. Rather than treating financial support, innovation, and partnerships as separate policy domains, the present findings suggest that these dimensions should be designed as mutually reinforcing components of industrial resilience. Strengthening this integrated ecosystem would not only enhance the competitiveness of KBLI Division 14 but also contribute to more inclusive, adaptive, and sustainable manufacturing development in Indonesia over the long term (Asian Development Bank, 2024).

CONCLUSION

This study provides a comprehensive longitudinal profile of Micro and Small Enterprises (MSEs) operating in Indonesia's KBLI Division 14 (Wearing Apparel Manufacturing) during the period 2020–2024 by analysing five interconnected structural dimensions, namely enterprise development, sources of business capital, innovation, business partnerships, and partnership schemes. The findings demonstrate that the post-pandemic recovery of the apparel manufacturing industry should not be interpreted merely as an increase in the number of enterprises but rather as a process of structural transformation characterised by the interaction between financial behaviour, innovation capability, and collaborative relationships. The continued reliance on internally generated capital, together with the gradual expansion of product-oriented innovation and the increasing adoption of operational and market-oriented partnerships, suggests that apparel manufacturing MSEs have primarily strengthened their resilience through incremental adaptation instead of radical organisational transformation. These findings confirm that industrial resilience emerges from the dynamic interaction of internal resources and external collaboration, enabling enterprises to maintain competitiveness under changing economic conditions.

From a theoretical perspective, this study contributes to the literature by integrating the Resource-Based View, Dynamic Capability Theory, Innovation Theory, Network Theory, and Industrial Resilience into a single analytical framework for examining structural changes within manufacturing SMEs. Unlike previous studies that have generally focused on individual aspects of the apparel industry, this research demonstrates that enterprise development is a multidimensional process in which financial structure, innovation behaviour, and partnership dynamics evolve simultaneously and mutually reinforce one another. The study therefore extends existing knowledge by illustrating that industrial resilience is not solely determined by firm-level resources but also by the capability to transform those resources into innovation and collaborative advantages within a broader industrial ecosystem. In addition, the use of nationally representative longitudinal data from Statistics Indonesia provides empirical evidence that complements the predominantly firm-level case studies available in the current literature.

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The findings also generate important practical implications. For policymakers, strengthening the competitiveness of Indonesia's apparel manufacturing sector requires integrated industrial policies that combine access to finance with innovation support, managerial capability development, digital transformation, and institutional collaboration. For enterprise managers, sustainable competitiveness depends not only on maintaining financial discipline but also on continuously developing innovation capabilities and strategic partnerships that facilitate knowledge exchange, supply-chain integration, and market expansion. These complementary approaches are expected to strengthen the adaptive capacity of manufacturing SMEs in responding to future economic uncertainty and industrial transformation.

Nevertheless, this study has several limitations that should be acknowledged. First, the analysis relies exclusively on secondary data published by Statistics Indonesia, which limits the ability to explore firm-level behavioural factors, managerial decision-making, and regional heterogeneity across Indonesia. Second, the descriptive longitudinal approach identifies structural trends but does not examine causal relationships among capital, innovation, partnerships, and enterprise performance. Future research is therefore encouraged to integrate official statistical data with primary surveys or qualitative interviews, employ explanatory approaches such as structural equation modelling or panel-data analysis, and compare industrial development across different manufacturing sectors or regions. Such studies would provide deeper insights into the mechanisms through which financial capability, innovation, and collaborative networks jointly influence the long-term competitiveness and resilience of manufacturing SMEs in Indonesia.

From a policy perspective, the findings suggest several practical implications for key stakeholders. Government institutions should prioritise policies that strengthen manufacturing MSE resilience through integrated financing support, technology adoption programmes, digital transformation initiatives, and capacity-building activities tailored to sector-specific needs. Industrial associations are encouraged to expand collaborative platforms that facilitate knowledge sharing, market access, technology transfer, and strategic partnerships among enterprises to enhance collective competitiveness. Meanwhile, financial institutions should develop more inclusive financing mechanisms by expanding access to affordable credit, introducing innovation-oriented financing schemes, and designing financial products that better accommodate the characteristics and business cycles of manufacturing MSEs. Future research should extend the present analysis by employing firm-level or regional datasets to capture heterogeneity across enterprises and geographical areas. In addition, the application of mixed-method approaches, panel-data analysis, or other inferential statistical techniques would provide deeper insights into the causal relationships among financing, innovation, partnerships, and enterprise performance, thereby contributing to a more comprehensive understanding of industrial resilience in developing economies.

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