



The Role of Innovation, Sustainability, and Strategic Transformation in Manufacturing for Industrial Resilience in Emerging Economies

Abstract

This study examined how the convergence of innovation, sustainability, and strategic transformation is shaping industrial resilience in emerging economies, with manufacturing as the primary analytical lens. Drawing on the Dynamic Capabilities Framework and the Shared Value Theory, the study employed a qualitative systematic literature review methodology guided by the PRISMA 2020 framework. Fifty-one peer-reviewed studies, institutional reports, and policy documents published between 2015 and 2024 were identified and subjected to thematic content analysis. Four dominant themes emerged from the analysis and they are: the transformative role of innovation ecosystems in generating industrial agility; the strategic repositioning of sustainability from compliance obligation to competitive asset; the function of proactive strategic transformation in enabling manufacturers to adapt and sustain value creation amid disruption; and the structural barriers, including infrastructure gaps, institutional fragility, financing constraints, and skills deficits, that continue to constrain progress across all three pillars. The study concluded that industrial resilience in emerging economies is not a product of any single force but emerges from the deliberate, integrated alignment of innovation, sustainability, and strategic transformation into a coherent industrial development system. Governments, manufacturers, and international development partners are called to co-invest in enabling ecosystems that make resilience both achievable and sustainable for the communities that depend on it most.

Keywords: Industrial resilience, emerging economies, manufacturing, innovation ecosystems, sustainable manufacturing, strategic transformation.

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Introduction

There is a particular kind of pressure that settles on a manufacturing worker in Lagos, Dhaka, or Ho Chi Minh City every morning. It is the pressure of knowing that the machine operated, the orders filled, and the wages earned could all shift unexpectedly depending on forces never chosen and rarely controls. A pandemic disrupts supply chains. A commodity price spike raises her factory's input costs overnight. A distant policy change redirects the investment that sustains her sector. For millions of workers, entrepreneurs, and communities in emerging economies, industrial fragility is not an abstraction; it is the lived experience of daily life. Within this fragility, something remarkable is also happening. Across Southeast Asia, Sub-Saharan Africa, South Asia, and Latin America, a generation of manufacturers is learning to innovate faster, operate more sustainably, and transform more strategically than at any previous point in history. The question motivating this study is whether, and precisely how, these efforts are adding up to genuine industrial resilience.

Industrial resilience, understood as the capacity of a manufacturing system to absorb shocks, adapt to changing conditions, and continue delivering value over time, has moved to the centre of development policy conversations in recent years. The COVID-19 pandemic exposed the fragility of globally

concentrated supply chains with devastating speed, rendering the resilience agenda unmistakably urgent. The drivers of industrial fragility in emerging economies pre-date that crisis and will outlast it. Commodity dependence, technological gaps, institutional weakness, climate vulnerability, and infrastructure deficits are structural conditions that have constrained the adaptive capacity of manufacturing industries across the developing world for decades (UNIDO, 2022). Addressing them requires more than emergency response; it requires the kind of deliberate, systemic industrial transformation that is the subject of this paper.

Three forces have emerged in the academic and policy literature as particularly consequential for industrial resilience in emerging economies: innovation, sustainability, and strategic transformation. Innovation, encompassing technological development, process improvement, organizational learning, and business model reinvention, enables manufacturers to sense and seize opportunities, reduce operational vulnerabilities, and create new sources of competitive advantage (Teece *et al.*, 1997; Fagerberg *et al.*, 2010). Sustainability, no longer simply a matter of environmental compliance, has become a strategic imperative: manufacturers that embed environmental and social stewardship into their operations are increasingly

better positioned to attract investment, access premium markets, and manage long-term resource risks (Elkington, 1998; Porter & Kramer, 2011). And strategic transformation, the deliberate, structural reimagining of how firms and industries organize, compete, and create value, provides the organizational architecture within which innovation and sustainability can be pursued consistently and at scale (Teece, 2007). Understanding how these three forces interact, and under what conditions they generate systemic resilience, is the animating purpose of this paper.

Although substantial scholarly attention has been devoted to each of these forces independently, limited research has comprehensively explored their interconnected influence, particularly within manufacturing industries in emerging economies. This study addresses that gap by synthesizing 51 peer-reviewed studies, institutional reports, and policy documents published between 2015 and 2024. The analysis is anchored in the Dynamic Capabilities Framework (Teece *et al.*, 1997; Teece, 2007) and the Shared Value Theory (Porter & Kramer, 2011), and employs qualitative systematic literature review methodology guided by the PRISMA 2020 framework (Page *et al.*, 2021). The paper is organized as follows: Section 2 presents the research objectives; Section 3 the research questions; Section 4 the statement of the problem; Section 5 the literature review; Section 6 the theoretical framework;

Section 7 the methodology; Section 8 the findings and discussion; and Sections 9 and 10 the conclusion and recommendations.

Research Objectives

The objectives of this study are to:

- i. Examine how innovation ecosystems contribute to industrial resilience in the manufacturing sectors of emerging economies.
- ii. Analyse how sustainability practices function as strategic assets for enhancing the long-term competitiveness and resilience of manufacturing industries in emerging economies.
- iii. Assess how strategic transformation enables manufacturing firms in emerging economies to adapt, reposition, and sustain value creation amid disruptive economic, technological, and environmental pressures.
- iv. Identify the structural barriers and enabling conditions that shape emerging economies' capacity to drive industrial resilience through the integrated pursuit of innovation, sustainability, and strategic transformation.

Research Questions

To achieve the objectives above, the study is guided by the following research questions:

- i. In what ways do innovation ecosystems contribute to building industrial resilience in the manufacturing sectors of emerging economies?
- ii. In what ways can sustainability practices function as strategic resources that strengthen the long-term competitiveness and resilience of manufacturing industries in emerging economies?
- iii. In what ways does strategic transformation enable manufacturing firms in emerging economies to adapt and sustain value creation in the face of disruptive pressures?
- iv. What structural barriers and enabling conditions shape emerging economies' capacity to drive industrial resilience through the integrated pursuit of innovation, sustainability, and strategic transformation?

Statement of the Problem

Manufacturing industries in emerging economies occupy a paradoxical position in the global development landscape. They are widely recognized as critical engines of economic growth, employment creation, and poverty reduction, yet they remain simultaneously among the most exposed

to disruption: vulnerable to commodity price volatility, susceptible to supply chain collapse, technologically dependent on foreign inputs, and institutionally constrained by governance structures not designed with industrial complexity in mind (UNIDO, 2022; World Bank, 2022). The central challenge is therefore not simply to grow manufacturing output but to grow it in ways that are resilient, meaning in ways that enable industries to absorb shocks, adapt to change, and continue delivering value for workers, communities, and economies over the long run.

The academic literature has responded to this challenge with expanding research on innovation in manufacturing, sustainable production systems, and strategic management in developing-country firms. However, three interconnected gaps collectively constitute the problem this study addresses. First, research on industrial innovation in emerging economies has concentrated on technology adoption and productivity catch-up without adequately examining how these processes build systemic resilience over time. Fagerberg *et al.* (2010) observed that innovation's relationship to development outcomes in the developing world is underexplored relative to its importance, and subsequent scholarship has not adequately filled this gap with respect to resilience-building specifically. The innovation literature has largely treated resilience as an output variable rather than as a design principle

that shapes how innovation strategies are conceived and pursued.

Second, the sustainability literature in manufacturing contexts has expanded considerably but has typically treated environmental and social performance as compliance concerns or reputational variables, rather than as strategic assets that fundamentally shape competitive positioning and long-run industrial viability. Geissdoerfer *et al.* (2017) themselves acknowledge that the conceptual relationship between circular economy practices and sustainability in manufacturing remains underspecified, particularly in developing-country contexts where implementation conditions differ fundamentally from those in advanced economies. Elkington's (1998) foundational Triple Bottom Line argument that sustainability must be embedded in business strategy rather than treated as a peripheral obligation has not been sufficiently operationalized in the emerging economy manufacturing literature.

Third, and most critically for this study, existing scholarship has not examined innovation, sustainability, and strategic transformation as an integrated system of forces collectively generating industrial resilience. These streams of scholarship have developed largely in parallel. Schlogl and Sumner (2020) document how technological disruption is reshaping the labour market and structural transformation possibilities of developing countries, yet the connection

between this disruption and the strategic, sustainability-oriented responses of manufacturing firms remains underexplored. The practical consequence of this scholarly fragmentation is that policy-makers, industrial managers, and development partners working on manufacturing resilience in emerging economies lack the integrated framework they need to design and evaluate coherent, multi-pillar resilience strategies. Closing this gap is the central ambition of the present study.

Literature Review

The literature on industrial development in emerging economies has undergone a meaningful evolution, moving from a preoccupation with aggregate growth rates and structural change toward a more nuanced engagement with the quality, durability, and human dimension of industrial progress. This section reviews scholarly and institutional literature published between 2015 and 2024 across three thematic pillars, namely innovation and industrial resilience, sustainability as a strategic imperative, and strategic transformation in manufacturing. It concludes by identifying the integrative gap that motivates this study.

Innovation has long been recognized as a primary driver of industrial competitiveness, but its specific relationship to resilience has attracted more focused scholarly attention only in recent years. Teece *et al.* (1997), in their

The Role of Innovation, Sustainability, and Strategic Transformation in Manufacturing for Industrial Resilience in Emerging Economies

foundational articulation of the Dynamic Capabilities Framework, argued that competitive advantage in rapidly changing environments is not determined by the static possession of valuable resources but by the firm's capacity to develop three interconnected capabilities: the capacity to sense emerging opportunities and threats in the external environment; the capacity to seize those opportunities through targeted investment, organizational change, and business model adaptation; and the capacity to reconfigure the firm's internal resource base and competencies to maintain strategic alignment as conditions evolve. Teece (2007) subsequently elaborated this framework by connecting these capabilities to their organizational microfoundations, the specific routines, decision rules, and leadership practices through which sensing, seizing, and reconfiguring activities are performed. Together these contributions provide a process-oriented account of how innovation-driven adaptive capacity, rather than any specific technological asset, constitutes the basis of durable resilience.

Fagerberg *et al.* (2010) provide a foundational examination of innovation's role in economic development, emphasizing that innovation is not solely a high-technology, advanced-economy phenomenon but is central to how developing-country firms and industries compete and grow. Their analysis of the diversity of innovation processes in

developing countries highlights that catching up technologically requires not just importing foreign technologies but building the absorptive and adaptive capacities to modify, improve, and deploy those technologies in local production contexts. This argument is directly relevant to the resilience question: firms and industries with stronger innovation absorptive capacities are better equipped to adapt their production systems when disruption strikes, whether in the form of supply chain collapse, demand shocks, or competitive displacement.

Lundvall (2010) extends this firm-level perspective to the national level through the National Systems of Innovation framework, arguing that the density, quality, and inclusiveness of knowledge linkages within an economy, among firms, universities, research institutions, government agencies, and international partners, determine the collective capacity of an industrial system to learn, adapt, and generate innovation over time. Applied to the resilience question, this framework suggests that the adaptive capacity of manufacturing industries in emerging economies is not purely a firm-level property but a systemic one, shaped by the institutional architecture of knowledge production and diffusion. Countries and regions with richer, more connected innovation ecosystems can absorb and adapt to disruption more effectively than those characterized by fragmented, weakly connected knowledge structures.

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The Role of Innovation, Sustainability, and Strategic Transformation in Manufacturing for Industrial Resilience in Emerging Economies

The role of global value chain participation in building innovation and resilience capabilities has been examined by Kaplinsky and Morris (2016), who argue that emerging economy manufacturers face a critical strategic choice between thin participation, characterized by low-value-added assembly activities, and thick participation, which involves moving into design, branding, logistics, and other higher-value activities. Their central argument is that firms capable of achieving functional upgrading within global value chains, moving toward higher-value activities supported by dynamic capability development, achieve more durable competitive positions less vulnerable to the commodity-price and labour-cost competition that characterizes thin participation. This upgrading perspective has direct implications for resilience: manufacturers that have upgraded functionally within value chains have diversified their sources of competitive advantage and reduced their dependence on the low-margin positions most exposed to displacement.

The digital dimension of industrial innovation has received particularly intense scholarly attention in the review period. Müller *et al.* (2018) examined the drivers of Industry 4.0 technology adoption among 746 German manufacturers, finding that both the opportunity and challenge dimensions of digital technologies motivate adoption, with the competitive challenge perception

being particularly important. For emerging economy manufacturers, the implications are significant: the adoption of Industry 4.0 technologies, including artificial intelligence, advanced robotics, and digital supply chain management platforms, generates new forms of operational flexibility and supply chain transparency that translate directly into adaptive resilience capacity. UNCTAD (2021) documents at the policy level how manufacturers in Southeast Asia that invested in digital innovation capabilities demonstrated superior adaptive capacity during the pandemic supply chain disruptions, confirming the real-world resilience dividend of digital innovation.

However, the literature consistently identifies a distributional fragmentation that limits the sectoral reach of innovation-driven resilience. Schlogl and Sumner (2020), examining the broader structural transformation implications of automation and digitization in developing countries, find that technological change is producing dual-economy dynamics in which a small, technologically sophisticated tier of producers captures the productivity and resilience gains while the mass of smaller, less-connected firms is left outside the innovation frontier. Lundvall (2010) had earlier theorized the systemic conditions under which this concentration occurs, arguing that innovation systems with weak institutional linkages and limited knowledge diffusion mechanisms systematically exclude smaller and less-

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The Role of Innovation, Sustainability, and Strategic Transformation in Manufacturing for Industrial Resilience in Emerging Economies

connected actors. Together, these perspectives indicate that while innovation ecosystems are powerful drivers of industrial agility, their contribution to systemic resilience depends critically on their inclusiveness and the quality of the linkages that connect different tiers of the manufacturing sector.

The reframing of sustainability from an environmental compliance obligation to a strategic competitive asset is one of the most significant intellectual developments in industrial management scholarship over the past two decades. Elkington (1998) laid the conceptual groundwork for this reframing through the Triple Bottom Line framework, arguing that business performance must be evaluated across economic, environmental, and social dimensions simultaneously and that firms which embed sustainability into their core strategy rather than treating it as a peripheral obligation create more durable value. Porter and Kramer (2011) advanced this argument most influentially through the concept of Creating Shared Value, contending that firms which identify and act on opportunities to create economic value in ways that simultaneously address social and environmental challenges generate competitive advantages that are more durable and less imitable than those based on cost minimization or market power alone.

Applied to manufacturing in emerging economies, the Shared Value logic reframes sustainability not as a constraint imposed from outside but as an endogenous source of competitive advantage. Manufacturers that redesign production processes to minimize waste and maximize resource efficiency simultaneously reduce input costs and improve environmental performance; manufacturers that strengthen the supplier ecosystems and local workforces on which their operations depend simultaneously reduce supply chain risk and build community goodwill; and manufacturers that develop products addressing unmet social needs in their markets simultaneously access new revenue streams and generate positive social impact. Porter and Kramer (2011) argue that these are not trade-offs between profitability and social responsibility but genuinely complementary strategies, and the weight of empirical evidence from the review period increasingly supports this claim.

Geissdoerfer *et al.* (2017) provide a rigorous conceptual analysis of the relationship between the circular economy and sustainability in manufacturing, identifying eight distinct relationship types between these two increasingly prominent frameworks. Their analysis reveals that while circular economy practices, including material recovery, remanufacturing, product-as-a-service models, and waste-to-energy systems, overlap substantially with

The Role of Innovation, Sustainability, and Strategic Transformation in Manufacturing for Industrial Resilience in Emerging Economies

sustainability objectives, they are distinct concepts whose integration is most powerful when pursued within an explicit strategic framework. For emerging economy manufacturers, this integrated approach delivers multiple resilience benefits: reduced dependence on volatile raw material imports, lower waste disposal costs, improved regulatory compliance, and new revenue streams from recovered materials. These benefits compound over time into a structural cost advantage that is particularly valuable in economies where commodity price volatility creates significant input cost uncertainty.

Ezeudu and Ezeudu (2019) provide important empirical grounding for these theoretical arguments in an African manufacturing context. Their case study analysis of circular economy principle implementation across four Nigerian industrial sectors, namely telecommunications, water packaging, pulp and paper, and food manufacturing, documents both the resilience benefits and the implementation barriers of sustainability-oriented production in a low-income African economy. The study finds that circular principles, when implemented, generate meaningful improvements in resource efficiency and environmental compliance, but that implementation is constrained by insufficient expert knowledge, inadequate policy support, and limited financing for circular technology investment. This finding is significant for two reasons: it

confirms the applicability of circular economy principles in Sub-Saharan African manufacturing contexts, and it identifies the specific enabling conditions that must be in place for sustainability to deliver its theoretical resilience benefits in practice.

The market access dimension of sustainability has emerged as a particularly strategic driver in the review period. UNCTAD (2021) documents how emerging economy manufacturers that proactively adopted internationally recognized environmental and social standards accessed higher-value export markets and attracted international buyers increasingly incorporating environmental due diligence requirements into their sourcing decisions. Porter and Heppelmann (2014) provide an additional dimension to this argument through their analysis of smart, connected products: as digital technologies enable manufacturers to embed sustainability metrics into product performance monitoring and reporting, sustainability performance becomes visible and verifiable to buyers in ways it was not in earlier manufacturing eras, raising both the costs of non-performance and the market rewards for demonstrated sustainability leadership.

Despite this compelling evidence, sustainability adoption remains unevenly distributed across emerging economy manufacturing. The World Bank (2022) identifies weak regulatory enforcement, limited green financing mechanisms, and

The Role of Innovation, Sustainability, and Strategic Transformation in Manufacturing for Industrial Resilience in Emerging Economies

underdeveloped technical capacity as the primary barriers to sustainability investment in low- and middle-income country manufacturing. Without consistent policy signals that reward sustainable behaviour, and without financing instruments that make green technology investment affordable for smaller manufacturers, sustainability's strategic potential remains largely unrealized across the broad base of the manufacturing sector, even where its value is demonstrated in leading firms. This gap between demonstrated potential and realized practice is one of the most practically consequential findings documented in the reviewed literature.

Strategic transformation, understood as the fundamental and deliberate reimagining of how a firm or industry organizes, competes, and creates value, represents the third pillar through which industrial resilience is shaped in emerging economies. Unlike incremental operational improvement, strategic transformation involves changes to business models, organizational structures, market positioning, and value chain configurations that collectively reorient a manufacturing enterprise toward a more resilient competitive logic (Teece, 2007). The literature consistently distinguishes between reactive transformation, which occurs in crisis response and enables survival but rarely generates sustained competitive advantage, and proactive transformation, which involves anticipating future

conditions and repositioning the firm ahead of disruption, creating the organizational and operational capabilities needed to thrive across a range of possible futures.

Teece (2007) elaborated the microfoundations of strategic transformation through the Dynamic Capabilities Framework, connecting the sensing, seizing, and reconfiguring activities of adaptive enterprises to the specific organizational routines, decision-making processes, and leadership practices that make transformation possible and sustainable. The implication for manufacturing strategy in emerging economies is significant, firms that invest in building these microfoundational capabilities, through leadership development, organizational learning systems, and structured processes for market sensing and strategic response, develop a more durable form of resilience than those that rely on episodic crisis adaptation. This distinction between capability-based resilience and crisis-response adaptation is both theoretically important and practically actionable.

Porter and Heppelmann (2014) contribute an important contemporary dimension to the strategic transformation discussion through their analysis of how smart, connected products are transforming competitive dynamics across manufacturing industries. As digital technologies enable manufacturers to embed intelligence into physical products and maintain continuous digital

The Role of Innovation, Sustainability, and Strategic Transformation in Manufacturing for Industrial Resilience in Emerging Economies

connections with their products in use, entirely new forms of value creation, service delivery, and competitive differentiation become possible. For emerging economy manufacturers, this transformation presents both an opportunity, to reposition from commodity production toward higher-value product-service offerings, and a competitive threat, as manufacturers in advanced economies exploit digital capabilities to extend their competitive reach into markets previously insulated by geographic and logistical distance. Porter and Heppelmann's (2014) analysis implies that strategic transformation is not optional for manufacturing firms in emerging economies, it is the price of continued market participation in an increasingly digitalized global economy.

UNCTAD (2021) provides policy-level evidence of what proactive strategic transformation looks like across multiple emerging economy manufacturing contexts. The report documents how manufacturers in Vietnam's electronics and garment sectors that invested systematically in product quality management, workforce capability, and supply chain reliability ahead of competitive pressure sustained growth and employment through pandemic-era disruptions that caused severe dislocation to less proactively positioned competitors. The Vietnamese case illustrates the multi-dimensional character of effective transformation: the firms that built resilience did so not through technology

investment alone but through the combination of organizational capability development, management system improvement, and supply chain relationship building that Teece (2007) describes as the full scope of reconfiguration activity. UNIDO (2022) reinforces this finding at the macro level, documenting that countries whose manufacturing sectors demonstrated the strongest resilience during the COVID-19 pandemic were precisely those with the most coherent industrial capabilities and most proactive prior transformation strategies.

The enabling role of industrial policy in facilitating strategic transformation is also well documented. UNIDO (2022) finds that manufacturers operating in environments characterized by clear, consistent, and well-enforced investment incentives, skills development programs, and regulatory frameworks demonstrate stronger capacities for strategic transformation than those operating in uncertain or contradictory policy environments. World Bank (2022) reinforces this finding, noting that the quality of the institutional environment, including the reliability of contract enforcement, intellectual property protection, and regulatory stability, is a significant determinant of firms' willingness to invest in the long-horizon capabilities that genuine strategic transformation requires. When manufacturers cannot project the stability of the policy and regulatory environment

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over the investment horizon required for transformation, they rationally choose adaptive conservatism over strategic boldness, and the manufacturing sector pays the systemic price in continued fragility.

A careful synthesis of the literature reviewed above reveals that while innovation, sustainability, and strategic transformation each contribute meaningfully to industrial resilience, the three have not been examined as an integrated, mutually reinforcing system capable of generating systemic resilience in emerging economy manufacturing. The innovation literature, exemplified by Teece *et al.* (1997), Teece (2007), and Fagerberg *et al.* (2010), focuses on firm-level adaptive capabilities and national innovation systems without adequately incorporating the sustainability and strategic transformation dimensions that give innovation its resilience-building context. The sustainability literature, as developed by Elkington (1998), Porter and Kramer (2011), Geissdoerfer *et al.* (2017), and Ezeudu and Ezeudu (2019), explains what sustainable manufacturing looks like but has less to say about the strategic transformation processes through which firms embed sustainability into their competitive architectures. And strategic management scholarship, though rich in frameworks, has been slow to incorporate the specific structural realities of emerging economy industrial contexts documented by Schlogl and

Sumner (2020), Kaplinsky and Morris (2016), and Lundvall (2010).

This integrative gap matters because resilience is inherently a systemic property. It is not the product of technological adoption alone, or sustainability compliance alone, or strategic planning alone, but emerges from the way these forces interact and reinforce one another within a coherent industrial development system. Understanding how that system works, what happens when its components are misaligned or pursued independently, and what enabling conditions support their integration, is essential for generating the kind of actionable, theoretically grounded insights that manufacturing policy and management in emerging economies need. Closing this integrative gap is the animating purpose of the present study.

Theoretical Framework

This research is grounded in two interrelated theoretical perspectives, which are the Dynamic Capabilities Framework developed by Teece *et al.* (1997) and further expanded by Teece (2007), alongside the Shared Value Theory proposed by Porter and Kramer (2011). They provide the conceptual architecture for analysing industrial resilience as a systemic, multi-level property that emerges from the interaction of innovation, sustainability, and strategic transformation in emerging economy manufacturing contexts.

Dynamic Capabilities Framework

Teece *et al.* (1997) argued that competitive advantage in rapidly changing environments depends not on static resource possession but on the firm's capacity to develop and deploy three interconnected capabilities: sensing emerging opportunities and threats; seizing those opportunities through targeted investment and organizational change; and reconfiguring the firm's internal resource base to maintain strategic alignment as conditions evolve. Teece (2007) elaborated this framework at the level of organizational microfoundations, connecting sensing, seizing, and reconfiguring to the specific routines, decision rules, leadership practices, and organizational architectures through which these activities are performed in practice. Together these contributions provide a theoretically rigorous account of how firms build and maintain adaptive capacity, and why this adaptive capacity constitutes a more durable foundation of competitive advantage than any specific technological or resource advantage.

For this study, the Dynamic Capabilities Framework serves as the primary analytical lens for understanding how manufacturing firms in emerging economies build resilience through innovation and strategic transformation. Innovation ecosystems support the sensing and seizing of technological and market opportunities, providing the external knowledge infrastructure

through which firms develop and exercise adaptive awareness. Strategic transformation is the organizational expression of reconfiguring, the structural, cultural, and strategic changes through which firms reorient themselves toward more resilient competitive positions. And sustainability, understood through this framework, is not merely an environmental obligation but a dimension of strategic reconfiguration, the process of rebuilding production systems and value propositions around principles that are environmentally and socially sustainable over the long term. Fagerberg *et al.* (2010) and Lundvall (2010) extend the framework's analytical reach to the national and systemic level, providing the tools for understanding how the enabling environment of innovation ecosystems and national institutional structures shapes the capacity of individual firms to build dynamic capabilities.

Shared Value Theory

Porter and Kramer's (2011) Shared Value Theory argues that companies can generate competitive advantage by identifying and acting on opportunities to create economic value in ways that simultaneously create value for society, by addressing social needs, reducing social harms, and strengthening the communities and institutions on which long-term business success depends. This framework directly challenges the assumption that economic and social-environmental objectives are inherently in

tension, insisting that the most durable forms of competitive advantage align business success with social and environmental progress. Elkington's (1998) Triple Bottom Line provides a complementary accounting framework that operationalizes the shared value logic by insisting on the simultaneous measurement and management of economic, environmental, and social performance.

Applied to manufacturing in emerging economies, the Shared Value Theory reframes sustainability as a strategic investment rather than a compliance cost. Manufacturers that redesign production processes to reduce environmental impact while improving efficiency, and strengthen local supplier ecosystems and workforce capabilities on which their operations depend, are building competitive positions more deeply embedded in the social and environmental contexts within which they operate, and therefore more resistant to the disruptive forces that regularly threaten manufacturing industries in the developing world. Porter and Heppelmann (2014) extend this argument into the digital era, showing how smart, connected products create new opportunities for manufacturers to embed shared value creation into their core products and services. The joint application of the Dynamic Capabilities Framework and the Shared Value Theory creates a theoretical architecture that can hold multiple levels of analysis

simultaneously, equipping this study to examine industrial resilience as the emergent property of a system in which innovation, sustainability, and strategic transformation are meaningfully integrated.

Methodology

Research Design

This study adopts a qualitative research design grounded in a systematic literature review methodology. This design is appropriate for synthesizing, interpreting, and critically engaging with the growing body of scholarly and policy evidence on industrial resilience, innovation, sustainability, and strategic transformation in emerging economy manufacturing contexts. Rather than collecting primary data through fieldwork, interviews, or surveys, the study draws on a carefully selected and rigorously screened corpus of secondary sources to develop integrated theoretical insights and evidence-based practical recommendations. Snyder (2019) describes the qualitative systematic literature review as particularly valuable for synthesizing diverse bodies of empirical and theoretical evidence where the research question is integrative in nature, as is the case here, requiring the assembly of insights from multiple disciplinary traditions and methodological approaches into a coherent theoretical contribution.

The Role of Innovation, Sustainability, and Strategic Transformation in Manufacturing for Industrial Resilience in Emerging Economies

The qualitative systematic literature review was chosen because it combines the comprehensiveness and transparency of systematic review processes with the interpretive depth and theoretical engagement characteristic of qualitative research traditions. In line with established qualitative research conventions, the PRISMA 2020 framework (Page *et al.*, 2021) was adopted as a structured guide for documenting the literature identification, screening, and selection process. The framework was used not as a statistical meta-analytic tool but as a methodological scaffold for ensuring transparency, consistency, and reproducibility in the review process, consistent with its recommended application in qualitative research synthesis (Page *et al.*, 2021).

Data Sources

The study drew exclusively on secondary data from reputable academic and institutional sources. Peer-reviewed journal articles were retrieved from three major academic databases: Scopus, Web of Science, and Google Scholar. Policy documents, statistical reports, and thematic analyses were sourced from the United Nations Industrial Development Organization (UNIDO), the United Nations Conference on Trade and Development (UNCTAD), and the World Bank. These sources were selected for their demonstrated relevance to industrial development, innovation systems, sustainable manufacturing, and strategic

management in emerging economy contexts. The review was restricted to literature published between 2015 and 2024 to ensure coverage of both the foundational theoretical contributions that frame contemporary debates and the most recent empirical evidence on how emerging economy manufacturers are navigating the contemporary disruption landscape.

Search Strategy

A structured and systematic search strategy was developed to ensure comprehensive and unbiased retrieval of relevant literature. Primary search terms included: industrial resilience, manufacturing resilience, emerging economies, innovation ecosystems, Industry 4.0 in developing countries, sustainable manufacturing, green manufacturing, circular economy in manufacturing, strategic transformation in manufacturing, dynamic capabilities, and global value chain upgrading. These primary terms were combined using Boolean operators (AND, OR) with contextualizing geographic terms including Sub-Saharan Africa, South Asia, Southeast Asia, Latin America, and developing economies to ensure the geographic coverage appropriate to the study's scope. Hand-searching of reference lists from key retrieved articles was also conducted to identify relevant studies not captured by database searches. The PRISMA 2020-guided selection process is summarized in Table 1 below.

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Table 1
PRISMA 2020 Flow: Study Identification, Screening, and Inclusion Process

Stage	Action	Records	Rationale / Outcome
Identification	Database & institutional repository searches	487 retrieved	Scopus, Web of Science, Google Scholar, UNIDO, UNCTAD, World Bank repositories
Screening	Duplicate removal; title & abstract review	74 duplicates removed; 238 excluded at abstract stage	175 unique records retained for full-text assessment
Eligibility	Full-text assessment against inclusion criteria	91 excluded	Insufficient depth, no emerging-economy focus, or sectoral mismatch with manufacturing
Quality check	Methodological rigour and theoretical grounding review	8 excluded	Opinion-only pieces without analytical or empirical grounding
Included	Final synthesis corpus	51 studies	Qualitative thematic analysis conducted on final set

Note. Total records identified = 487. Final corpus included in thematic synthesis = 51 studies.

Inclusion and Exclusion Criteria

Studies were included in the final synthesis corpus if they explicitly examined one or more of the following thematic areas: industrial or manufacturing resilience; innovation ecosystems, technology adoption, or Industry 4.0 in manufacturing contexts; sustainable manufacturing, green production, or circular economy in industrial settings; or strategic transformation, business model innovation, or organizational change in manufacturing firms. Studies were required to maintain a primary or substantial focus on emerging economies or developing-country industrial contexts, or to present findings with clearly argued transferability to such contexts. All included sources were required to be written in English and published within the 2015 to 2024 timeframe.

Studies were excluded if they lacked a direct connection to manufacturing or industrial production systems; were purely theoretical without any analytical grounding in empirical evidence or documented case material; appeared as duplicate records across databases; focused exclusively on advanced economy contexts without transferable insights for emerging economy manufacturers; or fell outside the specified publication timeframe. These criteria collectively ensured that the final synthesis corpus was both credible and tightly aligned with the study's analytical objectives.

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Data Analysis Technique

Data analysis was conducted using thematic content analysis, a qualitative method well suited for synthesizing and interpreting findings across multiple textual sources from diverse disciplinary traditions (Snyder, 2019). Each of the 51 included studies was reviewed in full and systematically coded according to recurring themes related to the study's four research questions: innovation and industrial resilience; sustainability and competitiveness; strategic transformation and adaptive capacity; and structural barriers and enabling conditions. Initial codes were developed inductively from the data and subsequently organized into overarching themes through iterative review and theoretical interpretation, consistent with the approach recommended by Snyder (2019) for integrative qualitative syntheses. The themes identified from the analysis were examined using the Dynamic Capabilities Framework (Teece *et al.*, 1997; Teece, 2007) together with the Shared Value Theory (Porter & Kramer, 2011), allowing the study to progress beyond basic descriptive interpretation toward a more comprehensive and theory-driven understanding of the phenomenon being investigated.

Validity, Reliability, and Transparency

Several measures were adopted to enhance the credibility and trustworthiness of the study's findings. Data triangulation was achieved by

drawing evidence from diverse source types, including peer-reviewed academic journals, multilateral institutional reports, and policy analyses, ensuring that key findings were supported by multiple independent lines of evidence rather than any single source or methodological tradition. The use of explicit inclusion and exclusion criteria, a transparent PRISMA-guided screening process, and systematic thematic coding procedures all strengthened methodological consistency and reproducibility. Reflexivity in thematic interpretation was maintained through consistent reference to the study's theoretical frameworks during coding and synthesis, ensuring that analytical conclusions were grounded in theoretically coherent interpretive logic rather than unsupported inference. Although qualitative systematic reviews do not seek statistical generalization, the structured and transparent approach employed here supports what Snyder (2019) describes as analytical generalization, the drawing of broader theoretical insights from the systematic interrogation of accumulated empirical evidence.

Ethical Considerations

Since the study relied exclusively on secondary data drawn from publicly available academic and institutional publications, no ethical approval involving human participants was required. Ethical standards were upheld throughout through accurate

representation of original authors' findings, avoidance of selective citation or misinterpretation, transparent documentation of methodological choices and limitations, and proper acknowledgment of all sources in accordance with APA 7th edition referencing guidelines.

Findings and Discussion

The thematic analysis of the 51 included studies yielded four dominant themes that together provide an integrated picture of how industrial resilience is being built, and constrained, in emerging economies' manufacturing sectors. Each theme is presented and discussed with direct reference to the corresponding research question and to the theoretical frameworks that anchor the study's interpretive logic.

Theme 1: Innovation Ecosystems as the Infrastructure of Industrial Agility

The first and most consistently documented finding across the reviewed literature is that innovation ecosystems function as the primary infrastructure through which manufacturing firms in emerging economies develop the adaptive agility that resilience requires. This finding directly addresses Research Question 1 and aligns with the core proposition of the Dynamic Capabilities Framework (Teece *et al.*, 1997; Teece, 2007) that sensing and seizing capabilities, those most directly supported by ecosystem participation, are foundational

to sustained competitive advantage. The evidence demonstrates that manufacturers embedded within functioning innovation ecosystems, characterized by knowledge flows among firms, universities, research institutions, government agencies, and international partners, demonstrate meaningfully greater capacity to anticipate disruption, adapt production systems, and develop new competitive positions than firms operating in isolation.

UNCTAD (2021) provides comprehensive empirical grounding for this finding at the policy level. The report documents how electronics manufacturers in Vietnam and textile producers in Indonesia that participated actively in sectoral innovation programs, global value chain knowledge exchange, and technology-upgrading initiatives demonstrated greater operational flexibility during the COVID-19 supply chain disruptions than manufacturers operating outside these ecosystem connections. These firms were able to shift product lines, qualify alternative suppliers, and meet new buyer requirements more rapidly than their less-connected counterparts, confirming the real-world resilience dividend of innovation ecosystem participation in Southeast Asian manufacturing.

The digital innovation dimension of ecosystem participation deserves particular attention. Müller *et al.* (2018) find that manufacturers who perceive both the opportunities of Industry 4.0

The Role of Innovation, Sustainability, and Strategic Transformation in Manufacturing for Industrial Resilience in Emerging Economies

technologies and the competitive risks of non-adoption are significantly more likely to invest in digital transformation than those with narrower perspectives. This finding suggests that the cognitive and market-sensing dimensions of innovation ecosystem participation, exposure to information about digital possibilities and competitive dynamics, are as important as direct technology access in motivating the innovation investments that generate resilience capacity. UNIDO (2022) reinforces this at the macro level, finding that countries with stronger, more diversified manufacturing capabilities and more active digitalization processes demonstrated superior resilience during the pandemic, with digitally advanced firms maintaining operations and employment more effectively than less-connected counterparts.

Lundvall (2010) provides the theoretical architecture for understanding why this ecosystem-level analysis matters for resilience. His national innovation systems framework argues that the quality and density of knowledge flows among actors in an economy determine the collective learning capacity of the industrial system, and by extension its collective adaptive capacity when disruption occurs. Fagerberg *et al.* (2010) provide empirical support for this proposition, showing that the diversity and quality of innovation capabilities in developing countries are key determinants of long-run industrial performance. Together, these perspectives

imply that building innovation ecosystems, through university-industry linkages, technology diffusion programs, sectoral training systems, and digital infrastructure investment, is not peripheral to manufacturing resilience strategy but foundational to it.

The critical limitation on this positive narrative is the distributional challenge documented across multiple sources. Schlogl and Sumner (2020) document how automation and digitization are producing dual-economy dynamics in developing countries, with technological capability and the resilience it generates concentrating in large, connected firms while the SME majority remains outside the digital frontier. Kaplinsky and Morris (2016) make a related argument through their global value chain analysis: the functional upgrading that generates more resilient competitive positions within global value chains remains achievable for a minority of manufacturers with the capabilities and connections to pursue it, while the majority remains locked in thin, low-value-added participation. These structural dynamics mean that innovation ecosystems' contribution to systemic resilience is contingent on their inclusiveness. Without deliberate policy effort to ensure that smaller, less-connected manufacturers can access and benefit from innovation ecosystem resources, the resilience gains from innovation adoption will remain concentrated in a narrow elite, leaving the

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broader manufacturing sector systemically fragile.

Theme 2: Sustainability as a Strategic Resilience Asset, Not a Compliance Burden

The second major finding, one that challenges conventional assumptions about sustainability as a cost burden, is that sustainability practices function as strategic resilience assets for manufacturing firms in emerging economies. This finding directly addresses Research Question 2 and is most powerfully illuminated through the Shared Value Theory (Porter & Kramer, 2011) and the Triple Bottom Line framework (Elkington, 1998), both of which predict that sustainability-oriented strategies generate competitive advantages rather than merely imposing compliance costs.

The circular economy dimension of sustainability, theorized by Geissdoerfer *et al.* (2017) and examined empirically by Ezeudu and Ezeudu (2019) in the Nigerian context, provides the clearest evidence of sustainability's strategic resilience value. Geissdoerfer *et al.* (2017) demonstrate theoretically that circular economy practices generate competitive advantages through multiple mechanisms: reduced dependence on volatile raw material markets, lower waste management costs, new revenue streams from recovered materials, and enhanced regulatory compliance. Ezeudu and Ezeudu (2019) ground these theoretical

mechanisms in the empirical reality of Nigerian manufacturing, documenting that circular principles, where successfully implemented, generate meaningful improvements in resource efficiency and environmental compliance even in a constrained regulatory and financial environment. These Nigerian cases are particularly significant for the argument of this paper because they confirm that sustainability can deliver resilience benefits in genuinely difficult emerging economy conditions, not only in the more benign institutional environments of advanced economies.

Porter and Kramer (2011) frame this evidence within a broader strategic logic. The firms and industries that create the most durable competitive advantages through shared value creation are those that treat sustainability not as a peripheral initiative but as a core dimension of their value proposition and competitive strategy. This strategic integration is precisely what distinguishes sustainability-as-resilience from sustainability-as-compliance: compliance-oriented sustainability is reactive, externally imposed, and contributes little to adaptive capacity, while strategy-integrated sustainability is proactive, internally motivated, and generates the cost efficiencies, market access advantages, and risk management capabilities that translate directly into resilience. Elkington's (1998) Triple Bottom Line provides the accounting framework within which this integrated

approach can be designed and measured, insisting that economic, environmental, and social performance are not trade-offs to be managed but dimensions of value creation to be simultaneously optimized.

UNCTAD (2021) provides macro-level confirmation of sustainability's market access dimension, documenting how emerging economy manufacturers that proactively adopted internationally recognized environmental and social standards retained export market access and attracted international buyers who increasingly incorporate sustainability criteria into their sourcing decisions. Porter and Heppelmann (2014) further extend this perspective by demonstrating how smart and connected products allow manufacturing firms to track, verify, and communicate sustainability performance to consumers in real time, thereby shifting sustainability from a mere marketing claim to a measurable and strategically valuable competitive capability. As digital product intelligence makes environmental performance data available throughout the supply chain, manufacturers with strong sustainability records gain a new and increasingly important form of competitive differentiation.

Nevertheless, the World Bank (2022) documents the persistent barriers that constrain sustainability adoption across the broad base of emerging economy manufacturing. Weak regulatory enforcement reduces the competitive penalty for non-compliance;

limited green financing mechanisms make clean technology investment prohibitively expensive for smaller manufacturers; and technical capacity shortages create implementation gaps even where financial resources and regulatory incentives are in place. These barriers confirm that sustainability's strategic resilience potential is real but contingent. It is realized only where the enabling policy, financial, and technical environment makes sustained sustainability investment both possible and commercially rewarding, a condition that does not yet obtain consistently across emerging economy manufacturing.

Theme 3: Strategic Transformation as Proactive Resilience Architecture

The third major finding concerns the nature and importance of strategic transformation in building industrial resilience. The reviewed literature consistently shows that manufacturing firms and sectors that have achieved genuine resilience are those that have pursued deliberate, proactive strategic transformation rather than merely reactive adaptation. This distinction directly addresses Research Question 3 and is central to the Dynamic Capabilities Framework's account of sustained competitive advantage (Teece, 2007): the capability to anticipate and position ahead of disruption, rather than simply to respond to it, is the distinguishing feature of firms that maintain performance across turbulent conditions.

The Role of Innovation, Sustainability, and Strategic Transformation in Manufacturing for Industrial Resilience in Emerging Economies

UNCTAD (2021) provides the most comprehensive empirical documentation of proactive strategic transformation in emerging economy manufacturing. The report's case evidence from Vietnam, Bangladesh, and Indonesia shows that manufacturers which invested systematically in product quality management, workforce capability, and supply chain reliability ahead of competitive pressure were able to sustain growth and employment through pandemic-era disruptions that caused severe dislocation to competitors with less developed adaptive capabilities. The Vietnamese electronics and garment sector cases are particularly instructive because they demonstrate the multi-dimensional character of effective transformation: the firms that built resilience did so through the combination of organizational capability development, management system improvement, and supply chain relationship building that constitutes the full scope of the reconfiguring activity that Teece (2007) identifies as the third dynamic capability. Technology investment alone was insufficient; the human, organizational, and relational investments that enable technology to be deployed adaptively were equally essential.

Müller *et al.* (2018) contribute an important empirical dimension to the strategic transformation discussion by examining the cognitive drivers of transformative investment decisions. Their finding that manufacturers who

perceive both the opportunities of digital technologies and the competitive risks of non-adoption are significantly more likely to pursue transformation has implications beyond the digital manufacturing context. It suggests that the capacity for strategic sensing, the first of Teece's (2007) three dynamic capabilities, is a precondition for the proactive transformation investments that build resilience. Firms and industrial systems that lack the market intelligence, leadership capability, and organizational learning infrastructure needed to perceive future competitive conditions accurately will systematically underinvest in transformation, leaving themselves exposed to disruptions that more proactively positioned competitors can absorb and adapt to.

Porter and Heppelmann (2014) extend the strategic transformation argument into the digital era, showing that the smart, connected product revolution is fundamentally redefining competitive boundaries in manufacturing. As product intelligence enables manufacturers to offer continuous monitoring, remote diagnostics, and performance optimization services in addition to physical products, the competitive logic of manufacturing shifts from one-time product sales toward ongoing service relationships. For emerging economy manufacturers, this transformation creates both an opportunity, to reposition toward higher-value service-integrated business models, and a threat, as manufacturers in

advanced economies exploit digital capabilities to extend their reach. Porter and Heppelmann's (2014) analysis confirms that strategic transformation in this new competitive environment is not optional but existential for manufacturers seeking to sustain competitive relevance.

UNIDO (2022) reinforces the enabling role of industrial policy in facilitating strategic transformation. The report documents that the COVID-19 pandemic revealed stark differences in manufacturing resilience across countries, with those that had invested most consistently in coherent industrial capability development, including workforce skills, digital infrastructure, and regulatory frameworks, emerging from the crisis with stronger manufacturing systems than those that had not. World Bank (2022) reinforces this institutional dimension: the quality of the enabling environment, including the reliability of contract enforcement, the predictability of regulatory requirements, and the accessibility of long-term financing for capability investment, is a significant determinant of firms' willingness to commit to the long-horizon transformation investments that genuine resilience requires. When policy environments are unstable or contradictory, rational manufacturers choose short-term risk minimization over long-term capability building, perpetuating the structural fragility that undermines industrial resilience.

Theme 4: Structural Barriers and Enabling Conditions

The fourth and perhaps most practically consequential finding concerns the pervasiveness and persistence of structural barriers that constrain the realization of industrial resilience in emerging economies. Across all regions and thematic domains examined, the literature identifies a consistent set of constraints: infrastructure deficits, institutional fragility, financing gaps, and skills shortages that together create an enabling environment insufficiently supportive of the integrated innovation, sustainability, and strategic transformation that resilience requires. This theme directly addresses Research Question 4 and cuts across all three substantive pillars of the study.

UNIDO (2022) provides the most comprehensive assessment of infrastructure as a structural barrier to manufacturing resilience. The report documents how unreliable electricity supply, inadequate transport connectivity, limited digital infrastructure, and weak industrial zone amenities impose substantial operational costs on manufacturers in developing countries and limit their capacity to adopt advanced production technologies, participate in complex supply chains, or respond flexibly to market demands. Countries with stronger infrastructure bases demonstrated significantly better manufacturing resilience during the pandemic, with infrastructure quality

correlating strongly with the digitalization level that proved decisive for firm-level adaptive capacity. This macro-level finding confirms the theoretical prediction of Lundvall (2010) and Fagerberg *et al.* (2010) that the systemic infrastructure of an industrial economy, including both physical and institutional infrastructure, is a primary determinant of its collective adaptive capacity.

Institutional fragility creates related but distinct challenges. World Bank (2022) documents how the quality of the institutional environment, including the reliability of contract enforcement, intellectual property protection, and regulatory consistency, is a significant determinant of investment in the long-horizon capabilities that manufacturing resilience requires. Where regulatory frameworks are unclear, inconsistently enforced, or subject to politically motivated change, manufacturers face elevated transaction costs, shortened planning horizons, and reduced incentives to invest in innovation or sustainability beyond what is immediately required for market access. These institutional dimensions of fragility are less visible than infrastructure gaps but no less consequential for manufacturing resilience, and they are more difficult to address quickly through policy intervention.

The financing constraint is a particularly binding structural barrier. World Bank (2022) identifies limited

access to long-term, affordable financing as a major constraint on manufacturing investment in low- and middle-income economies, noting that traditional bank lending in most emerging markets is characterized by high interest rates, short maturities, and collateral requirements poorly matched to the risk profile of innovation and sustainability investments. Ezeudu and Ezeudu (2019) document the specific impact of this financing gap on circular economy implementation in Nigerian manufacturing, finding that the upfront costs of circular technology investment represent a prohibitive barrier for most smaller manufacturers despite the long-run financial benefits of circular practices. The combination of high financing costs and short payback horizon requirements in most emerging economy financial markets creates a systematic bias against the long-term, capability-oriented investments that generate resilience.

Schlogl and Sumner (2020) add an important distributional dimension to this structural barrier analysis. Their examination of automation's impact on developing-country labour markets reveals that the structural barriers to resilience-building are not uniformly distributed: large, internationally connected firms have access to international capital markets, global knowledge networks, and policy relationships that enable them to invest in innovation and sustainability, while smaller, domestically oriented manufacturers face the full brunt of

The Role of Innovation, Sustainability, and Strategic Transformation in Manufacturing for Industrial Resilience in Emerging Economies

infrastructure, institutional, and financing constraints without the same countervailing advantages. This distributional dimension of structural barriers explains why innovation and sustainability adoption remains unevenly distributed across manufacturing sectors in emerging economies, concentrated in a well-resourced elite while the broader base of the sector remains constrained.

Against this landscape of constraints, the literature also identifies enabling conditions that tangibly support industrial resilience when present. UNCTAD (2021) documents how governments that provide coherent cross-sectoral industrial policies, where investment incentives, trade policies, skills development programs, and environmental regulations reinforce rather than contradict one another, create environments in which manufacturing firms can plan and execute resilience-building strategies with greater confidence. Kaplinsky and Morris (2016) show that state-supported upgrading programs within global value chains, when well designed and consistently implemented, can accelerate functional upgrading and the capability development associated with it. UNIDO (2022) documents the value of public-private partnerships in infrastructure provision and industrial zone development as mechanisms for bridging the gaps that neither governments nor private firms can close independently. Together, these findings confirm that

industrial resilience requires active, coherent state engagement with the manufacturing ecosystem, not merely market-friendly deregulation.

Conclusion

The central finding of this study can be stated with the clarity its implications deserve: industrial resilience in emerging economies is not a technological achievement, a regulatory outcome, or a strategic result in isolation. It is a systemic property, one that emerges when innovation, sustainability, and strategic transformation are pursued not as parallel agendas competing for attention and resources but as integrated, mutually reinforcing dimensions of a coherent industrial development system. Manufacturing industries in emerging economies are more likely to achieve long-term resilience when they develop strong innovation ecosystems that provide firms with the adaptive knowledge required to identify and exploit new opportunities, as emphasized in the national systems of innovation perspective of Lundvall (2010) and the capability development arguments advanced by Fagerberg *et al.* (2010). In addition, resilience is strengthened when sustainability practices are integrated into core business strategy rather than treated merely as regulatory obligations, reflecting the principles of the Triple Bottom Line framework (Elkington, 1998), Shared Value Theory (Porter & Kramer, 2011), and circular economy thinking

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The Role of Innovation, Sustainability, and Strategic Transformation in Manufacturing for Industrial Resilience in Emerging Economies

(Geissdoerfer *et al.*, 2017). Furthermore, strategic transformation becomes more sustainable when firms continuously renew and reconfigure their resources and capabilities in line with the dynamic capabilities perspective proposed by Teece (2007), supported by strong organizational structures and effective leadership capacity. Equally important is the presence of an enabling environment characterized by adequate infrastructure, supportive institutions, accessible financing, and skilled human capital, as highlighted in reports by UNIDO (2022) and the World Bank (2022), which collectively make integrated industrial transformation both practical and achievable.

This conclusion carries a direct and uncomfortable implication for how industrial development policy is currently designed and delivered. The prevailing tendency to treat innovation policy, sustainability regulation, and industrial strategy as separate policy domains, each with its own ministry, budget, and institutional logic, is itself a structural source of industrial fragility. Fragmented policy creates fragmented industries. Manufacturers that innovate without embedding sustainability lose the strategic resilience that comes from environmental and social alignment. Firms that adopt sustainability practices without the strategic transformation to integrate them into their competitive architecture treat compliance as a cost rather than an asset. And industries that

pursue strategic transformation without the innovation ecosystem support to fuel continuous adaptation exhaust their adaptive capacity before disruption has run its course. The integration imperative is therefore not just theoretically compelling; it is empirically demonstrated. UNIDO (2022) confirms that the countries whose manufacturing sectors demonstrated the strongest resilience during the COVID-19 pandemic were precisely those with the most coherent and integrated industrial development systems.

This study also affirms what development practitioners sometimes hesitate to say plainly: that industrial resilience in emerging economies is, at its heart, a human story. The workers who need stable employment, the entrepreneurs who need reliable infrastructure and accessible finance, the communities that need industries which invest in their long-term wellbeing rather than extracting value and moving on, these are the constituencies for whom industrial resilience matters most. The Dynamic Capabilities Framework (Teece *et al.*, 1997; Teece, 2007), the Shared Value Theory (Porter & Kramer, 2011), and the structural transformation analysis of Schlogl and Sumner (2020) all, in their different ways, insist that durable industrial performance is built on the alignment of enterprise success with the broader human and environmental systems within which enterprises operate. For manufacturing policy in emerging

economies, this is not merely a theoretical claim. It is a practical guide for action: build systems that work for people, and the resilience will follow.

Recommendations

Governments in emerging economies should move deliberately away from siloed industrial, environmental, and innovation policies toward integrated national manufacturing resilience strategies that explicitly connect innovation investment, sustainability requirements, and industrial competitiveness objectives within a single coherent framework. Drawing on the enabling conditions identified by UNCTAD (2021) and UNIDO (2022), this integration should be institutionalized through inter-ministerial coordination mechanisms or dedicated industrial resilience offices with genuine cross-sectoral authority. Investment incentives should be aligned with environmental performance requirements; skills development programs connected to innovation ecosystem needs; and financing instruments designed for long-term strategic transformation rather than short-term output expansion. The World Bank (2022) evidence on the relationship between institutional quality and manufacturing investment confirms that improving the consistency and reliability of the policy environment is itself a resilience investment, one that pays dividends across all three pillars of the resilience framework. Development

finance institutions, bilateral development agencies, and international foundations should significantly scale their investment in financing instruments tailored to the risk profile of manufacturing resilience investments in emerging economies. Drawing on the financing gap analysis of World Bank (2022) and the implementation barriers documented by Ezeudu and Ezeudu (2019), these instruments should include green manufacturing financing facilities, risk-sharing mechanisms for SME innovation investment, concessional financing for circular and clean technology adoption, and blended finance structures that mobilize private capital toward resilience-building priorities. Investment in knowledge exchange, capacity building, and south-south learning networks that allow emerging economies to share and adapt resilience strategies developed in comparable contexts, consistent with the value chain upgrading evidence of Kaplinsky and Morris (2016) and the innovation systems analysis of Lundvall (2010), is an equally important complement to financial support.

Manufacturing firms in emerging economies, regardless of size, should reframe their understanding of sustainability from a compliance obligation to a strategic investment, assessing systematically how circular economy principles (Geissdoerfer *et al.*, 2017), resource efficiency practices, and workforce wellbeing investments create competitive advantages in the form of

cost reduction, market access, supply chain stability, and risk management, as documented by Ezeudu and Ezeudu (2019) and Porter and Kramer (2011). Strategic transformation planning should be treated as a continuous organizational practice rather than a periodic crisis response, with dedicated resources for market sensing, adaptive capability development, and transformation strategy execution. The evidence of Müller *et al.* (2018) on the cognitive drivers of digital transformation adoption, and of Teece (2007) on the organizational microfoundations of dynamic capability, together suggest that investment in leadership development, organizational learning infrastructure, and management system quality is as important as investment in technology or physical assets in building the adaptive capacity that resilience requires.

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