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BARRIERS TO INNOVATION IN MICRO-SCALE ENTERPRISES: A MULTIDIMENSIONAL ASSESSMENT OF FINANCIAL, ORGANIZATIONAL, TECHNOLOGICAL, AND ECOSYSTEM CONSTRAINTS

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Abstract:
Micro-scale enterprises constitute a substantial part of national economies, particularly in emerging and developing markets, by contributing to employment, local production, and entrepreneurial dynamism. This study aims to examine thhe barriers to innovation in micro-scale enterprises through a multidimensional perspective that integrates financial, organizational, technological, human-capital, aand ecosystem-related constraints. The paper argues that innovation barriers in micro enterprises should not be interpreted merely as a lack of funding or technological infrastructure; rather, they emerge from the interaction of limited managerial capabilities, weak strategic planning, insufficient access to skilled labor, low digital maturity, risk aversion, fragmented instiitutional support, and restricted collaboration with universities, public agencies, and larger firms. The study is designed as a conceptual and literature-based analysis that synthesizes exissting research on small business innovation, resource constraints, absorptive capacity, dynamic capabilities, and entrepreneurial ecosystems. Based on this synthesis, the article proposes an integrated framework for classifying innovation barriers in micro-scale enterprises under five main dimensions: resource-based barriers, capability-based barriers, market-related barrierss, institutional and ecosystem barriers, and cultural-behavioral barriers. The expected contribution of the study is twofold. First, it provides a holistic understanding of why micro enterprises frequently remain outside formal innovation systems despite their flexibility and entrepreneurial potential. Second, it offers a conceptual foundation for future empirical studies and policy designs aimed at strengthening innovation capacity at the micro-enterprise level. The article concludes that enhancing innovation in micro-scale enterprises requires not only financial incentives, but also tailored capability-building programs, digital transformation support, accessible consultancy mechanisms, collaborative innovation platforms, and differentiated public policies that recognize the unique characteristics of micro businesses.

Keywords:
Micro-scale enterprises, innovationn barriers, small business innovation, digital maturity, entrepreneuriall ecosystem, resource constraints, absorptive capacity

1. Introduction
Micro-enterprises constitute the most numerous and, in many economies, the most socially embedded layer of the business ecosystem. They are often founded with limited capital, operate with fewer than ten employees, and remain closely tied to local markets, family labor, and owner-centered decision-making structures. In Türkiye, as in many other countries, micro-scale firms represent a substantial portion of the enterprise population and continue to play a vital role in employment creation, local production, and entrepreneurial dynamism. Yet, despite their numerical dominance, these enterprises frequently remain at the margins of innovation policy, which tends to focus more visibly on high-growth start-ups, technology-intensive firms, and export-oriented SMEs. This creates a significant analytical and policy gap: the enterprises that most need adaptive capacity are often the least equipped to build it. (KOSGEB, 2025; TÜİK, 2025)

In the contemporary business environment, innovation is no longer a discretionary activity reserved for large corporations or technology-oriented ventures. Intensifying competition, accelerated digitalization, platform-based business models, evolving consumer expectations, and increasing sustainability pressures have made innovation a central condition of survival for firms of every size (Karabulut et al., 2020). For micro-enterprises, however, innovation should not be narrowly interpreted as formal research and development or patent-based technological breakthroughs. Rather, it may emerge through small but meaningful improvements in production routines, customer

relations, digital sales channels, service delivery, pricing models, supply practices, or organizational flexibility. In this sense, innovation in micro-enterprises is frequently incremental, practical, and problem-driven. Its value lies not necessarily in scale, but in its capacity to strengthen resilience, responsiveness, and market relevance. OECD analyses increasingly emphasize that smaller firms require broader participation in innovation systems, particularly as technological change and digital transformation reshape competitiveness across sectors. (OECD, 2024, 2025)

Nevertheless, micro-enterprises face a structural paradox. They are typically more vulnerable to market shocks and competitive pressures than larger firms, making innovation particularly necessary; at the same time, they possess fewer financial, human, managerial, and informational resources to pursue innovation systematically. Access to finance remains one of the most persistent constraints, especially when innovative activities require uncertain investments, new technologies, or organizational experimentation. Skills shortages and difficulties in recruiting qualified personnel further narrow their innovation capacity. In addition, many micro-enterprises lack formalized strategic planning, dedicated innovation units, or the absorptive capacity required to identify, evaluate, and implement external knowledge. As a result, innovation often depends heavily on the intuition, motivation, and prior experience of the owner-manager, rather than on institutionalized routines. Recent studies on small and medium-sized firms confirm that finance, skills, managerial capabilities, and technological readiness continue to shape the innovation potential of smaller business units. (OECD, 2024; Kassa, 2025; Wojtaszek, 2025)

The problem becomes more complex when the external environment is considered. Micro-enterprises frequently operate outside strong innovation networks and have limited interaction with universities, technology centers, export support mechanisms, and professional consultancy services. Public support programs may exist, yet their application procedures, documentation requirements, or eligibility criteria can appear burdensome for very small firms with limited administrative capacity. Similarly, digital tools that could lower costs and expand market access are not always adopted effectively, due to both financial barriers and capability gaps. Although digitalization has the potential to improve efficiency, reduce trade costs, and enable small firms to internationalize, these benefits are unevenly distributed and tend to favor enterprises that already possess minimal levels of knowledge, infrastructure, and organizational readiness. Thus, micro-enterprise innovation should be understood not simply as a matter of entrepreneurial will, but as a capability problem embedded in a wider institutional and ecosystemic context. (OECD, 2024; European Parliament, 2025; European Commission, 2024)

Existing literature has extensively discussed innovation barriers in SMEs, manufacturing firms, and technology-based ventures. However, micro-enterprises often appear either as a residual category within broader SME analyses or as statistically underrepresented actors in innovation studies. This tendency may obscure the distinctive nature of their constraints. A small firm with forty employees and a micro-enterprise employing three or four people do not confront innovation in the same way. The latter is far more dependent on the owner-manager, more exposed to liquidity pressures, more limited in external networking, and less capable of separating daily operations from strategic development. Therefore, the present study argues that innovation barriers in micro-enterprises deserve focused conceptual examination, not merely as a scaled-down version of SME barriers, but as a specific configuration of structural, managerial, and ecosystem-based challenges.

Against this background, this article aims to examine the principal barriers that hinder innovation in micro-enterprises and to offer an integrated conceptual assessment of these obstacles. The study is structured around three interrelated objectives. First, it clarifies why innovation has become indispensable for micro-enterprises in a rapidly transforming economic environment. Second, it categorizes the main barriers to innovation under resource-based, managerial-organizational, and external ecosystem dimensions. Third, it proposes an integrated framework showing that these barriers are not isolated problems but mutually reinforcing constraints that jointly suppress innovative behavior and long-term competitiveness. In doing so, the article seeks to contribute to the literature on micro-enterprise development while also generating practical insights for policymakers, support institutions, and entrepreneurs seeking to strengthen innovation capacity at the smallest scale of the business system (Öz, et al. 2019).

2. The Innovation Imperative for Micro-Enterprises

Innovation has become a fundamental condition of survival for micro-enterprises operating in increasingly volatile, digitalized, and competitive markets. Traditionally, innovation has often been associated with large firms, formal research and development activities, patents, or technology-intensive sectors. However, this narrow understanding does not fully capture the reality of micro-enterprises. For very small businesses, innovation is more frequently

expressed through incremental and practice-oriented changes: adopting a new digital payment system, creating an online sales channel, redesigning customer communication, improving delivery processes, diversifying products, or reorganizing daily work routines. These forms of innovation may appear modest in scale, yet they can significantly influence the continuity, adaptability, and competitiveness of micro-enterprises. In this respect, innovation should be interpreted not only as a technological phenomenon but also as a managerial and behavioral capability that enables small firms to respond to changing economic conditions. (OECD, 2024a; OECD, 2024b)

The growing necessity of innovation for micro-enterprises is closely related to the changing structure of markets. Digital platforms, e-commerce ecosystems, social media-based marketing, mobile payment systems, and data-driven customer relations have transformed the rules of competition. Firms that were once able to survive through neighborhood familiarity, traditional sales habits, and stable local demand now face customers who compare prices instantly, expect faster service, and evaluate products through digital visibility. This transformation creates pressure, but it also opens new possibilities. Digital tools can lower entry barriers, help small firms test ideas with limited resources, and create access to broader markets that would previously have been difficult to reach. The OECD emphasizes that digitalization can improve productivity, increase flexibility, and support experimentation among smaller firms, although these advantages remain unevenly distributed due to capability gaps and resource limitations. (OECD, 2024b; OECD, 2025)

For micro-enterprises, innovation is also increasingly tied to resilience. Economic shocks, inflationary pressures, supply chain disruptions, shifts in consumer behavior, and rapid changes in input costs affect miicro-scale firms more intensely because they generally operate with narrower financial buffers and lower organizational redundancy. In such an environment, innovative capacity becomes a mechanism of adaptation. A micro-enterprise that can rapidly modify its sourcing strategy, introduce a new service format, establish direct digital communication with customers, or shift part of its business model to online channels may be better positioned to withstand market turbulence. Recent policy-oriented discussions on small business transformation underline that innovation and digitalization should not be seen merely as growth instruments, but also as tools for managing shocks and maintaining business continuity. (OECD, 2024b; IMF, 2024)

Another reason innovation is vital for micro-enterprises lies in their relationship with larger economic ecosystems. Miicro firms are increasingly expected to participate in more sophisticated supply chains, comply with new sustainability and digital reporting requirements, respond to changing procurement standards, and operate in markets where quality, traceability, responsiveness, and customer experience are decisive. Even when they are not direct exporters or technology producers, micro-enterprises are affected by the innovation standards diffusing through the wider economy. This means that the ability to innovate at the micro level is no longer solely a firm-specific issue; it is also connected to inclusive productivity growth, local development, and the broadening of national innovation systems. European and OECD policy documents increasingly stress that the transition toward more competitive, sustainable, and digital economies depends on the capacity of small firms to join innovation processes rather than remain outside them. (European Commission, 2025; OECD, 2024a)

Yet the innovation imperative should not be romanticized. Micro-enterprises may be flexible, close to their customers, and capable of making quick decisions, but these qualities do not automatically produce innovation. Their small scale can enable agility, but it can also mean vulnerability, excessive deependence on the owner-manager, limited access to specialized knowledge, and an inability to allocate time or resources to experimentation. Therefore, the central issue is not whether micro-enterprises need innovation—they clearly do—but whether they possess the conditions required to generate, absorb, and sustain it. Studies on smaller firms indicate that innovation outcomes are shaped by managerial capabilities, absorptive capacity, external collaboration, and the ability to translate knowledge into business practice. In micro-enterprises, these factors are often concentrated in a single individual: the owner-manager. Consequently, the innovative trajectory of the firm may largely depend on the owner's awareness, llearning orientation, openness to collaboration, and willingness to tolerate uncertainty. (Stawasz, 2021; Petley, 2024)

From this perspective, innovation in micro-enterprises should be viewed as both a necessity and a constrained possibility. It is necessary because market conditions increasingly punish stagnation; it is constrained because the very characteristics that define micro-enterprises—small workforce, limited finance, informal routines, and owner-centered mmanagement—can reduce their capacity to innovate systematically. This duality makes micro-enterprises an especially important field of inquiry. Understanding their innovation barriers requires moving beyond a generic SME perspective and examining how structural fragility, managerial limitations, and ecosystem deficiencies interact at

the smallest level of business organization. The next section therefore focuses on the principal obstacles that prevent micro-enterprises from translating innovation need into innovation practice.

3. Major Barriers to Innovation in Micro-Enterprises

Although innovation has become increasingly necessary for micro-enterprises, the capacity to innovate is often constrained by a combination of internal fragilities and external limitations. Unlike larger firms, micro-enterprises rarely possess specialized departments, dedicated innovation budgets, formalized strategic planning systems, or extensive networks of knowledge partners. Their innovative behavior is therefore shaped by a narrow resource base, the competencies and attitudes of the owwner-manager, and the quality of the ecosystem in which they operate. Recent studies on micro, small, and medium-sized enterprises suggest that barriers to innovation should not be understood as isolated obstacles; rather, they form an interconnected structure in which financial limitations, managerial weaknesses, low absorptive capacity, and insufficient external support reinforce one another. (Bittar & Di Serio, 2023; Aggarwal, 2024; Wojtaszek et al., 2025)

3.1. Resource-Based Barriers: Finance, Time, Skills, and Technological Capacity

The most visible barriers to innovation in micro-enterprises are resource-based. Innovation, even when incremental, requires a minimum level of financial flexibility, time allocation, technical knowledge, and access to tools or technologies. Micro-enterprises often operate under severe liquidity constraints and prioritize short-term survival over medium- or long-term capability building. This tendency weakens their ability to invest in new equipment, digital tools, training, market research, or product development. Empirical evidence indicates that limited access to finance reduces the performance of micro, small, and medium-sized enterprises and constrrains their ability to make productivity-enhancing investments. In innovation-related contexts, this problem becomes sharper because innovative investments are frequently uncertain, intangible, and difficult to collateralize. (IMF, 2024; Bittar & Di Serio, 2023)

Time scarcity is another critical but often underestimated constraint. In micro-enterprises, the same person may simultaneously manage sales, purchasing, accounting, customer relations, employee coordination, and crisis resolution. Under these conditions, innovation is frequently postponed not because it is considered unimportant, but because the daily operational burden leaves little room for experimentation or strategic reflection. The OECD's 2025 D4SME survey identifies lack of time for training, maintenance costs, and hardware costs among the most significant barriers to digitalization in smaller firms. Since digital transformation is one of the most common routes through which micro-enterprises engage in innovation, these findings are highly relevant for understanding their broader innovation deficit. (OECD, 2025)

Human capital limitations further intensify the problem. Micro-enterprises usually have small teams with limited functional specialization. They may lack employees who can manage digital marketing, data analytics, e-commerce systems, sustainability reporting, process redesign, or customer experience innovation (Öz, et al. 2024). Even when technological solutions are affordable, firms may not possess the internal skills required to select, implement, and benefit from them. Research on innovation in smaller firms repeatedly emphasizes that capabilities—not merely access to technology—determine whether innovation efforts generate value. Innovation capabilities related to customer understanding, marketing adaptation, and technological orientation are associated with different performance outcomes, indicating that the quality of capabilities matters as much as the availability of resources. (Osiyevskyy et al., 2025; OECD, 2025)

Technological capacity should also be understood beyond the possession of machines or software. It includes the ability to integrate digital tools into business routines, redesign workflows, use external information effectively, and create learning mechanisms within the firm. Micro-enterprises may adopt isolated technologies—such as social media accounts, mobile payment systems, or e-commerce pages—without developing a coherent digital or innovation strategy. This fragmented adoption produces limited benefits and may even increase costs or managerial complexity. In this respect, lack of technological readiness becomes not simply a hardware problem but a systemic capability gap. Studies on digital service innovation and technology adoption in small firms underline that novelty, rapid technological change, information security concerns, and limited internal expertise remain important barriers to innovation-based transformation. (de la Calle et al., 2025; OECD, 2025)

3.2. Manageriall and Organizational Barriers: Owner-Centered Structures, Risk Perception, and Limited Absorptive Capacity

A second group of barriers emerges from the managerial and organizational characteristics of micro-enterprises. Their decision-making systems are typically highly centralized, with strategic choices resting largely on the owner-manager. This feature may provide speed and flexibility, but it can also produce excessive dependence on the knowledge, mindset, and risk tolerance of one individual. When the owner-manager has limited exposure to new technologies, weak innovation awareness, or a defensive attitude toward change, the entire firm's innovation potential may be narrowed. In very small firms, innovation culture is not distributed across departments; it is often embodied in the owner's personal orientation toward learning and experimentation. (Stawasz, 2021; Bäck, 2023)

Risk aversion is particularly influential in this context. Because micro-enterprises operate with limited reserves, failed experimentation can be perceived as highly costly. A larger firm may absorb unsuccessful pilots, delayed returns, or trial-and-error processes, while a micro-enterprise may interpret similar outcomes as existential threats. This creates a tendency to favor familiar practices over uncertain innovations, even when the latter may offer long-term benefits. Studies on innovation in small firms show that firm constraints can weaken the translation of proactive innovation into performance, suggesting that even when businesses are willing to innovate, internal limitations reduce the expected payoff of innovative behavior. (Liem, 2019; Wojtaszek et al., 2025)

Another important managerial obstacle is the absence of formal strategic planning. Many micro-enterprises respond to market changes reactively rather than proactively. Innovation decisions may arise from immediate problems—declining sales, customer complaints, rising costs—rather than from an articulated strategy for future competitiveness. This can result in sporadic and fragmented innovation efforts that are not supported by clear objectives, performance indicators, or learning routines. Without a strategic frame, innovation becomes a response to pressure rather than a deliberate process of value creation. The literature on micro and small enterprises suggests that public support and innovation policies become more effective when they strengthen firms' internal innovation capabilities rather than merely providing isolated financial incentives. (Bittar & Di Serio, 2023)

Closely related to these issues is the problem of absorptive capacity, namely the ability of a firm to recognize, assimilate, and apply external knowledge. For micro-enterprises, this capacity is often weak because they have limited formal training systems, restricted access to advisory services, and little time to scan external developments. Earlier research on micro and small firms shows that the ability to absorb business advice improves business knowledge, while studies on innovation in micro-enterprises stress the importance of combining internal experience with external information. More recent work on open innovation in SMEs likewise confirms that firms benefit from external knowledge only when they possess the internal capacity to interpret and mobilize it. (Stawasz, 2021; Roper et al., 2017; Carrasco-Carvajal et al., 2023)

Thus, managerial and organizational barriers are not secondary to financial constraints; they are central determinants of innovation behavior. A micro-enterprise with modest resources but strong learning orientation, strategic openness, and collaboration skills may innovate more effectively than a better-funded firm that remains inward-looking and risk-averse. Conversely, financial support alone may have limited impact if the firm lacks the managerial capacity to identify relevant opportunities and convert them into sustainable business practices. This interaction between resources and capabilities reveals why innovation policy for micro-enterprises cannot be reduced to funding instruments alone.

3.3. External and Ecosystem-Based Barriers: Weak Networks, Limited Institutional Access, and Uneven Support Mechanisms

The third major barrier category concerns the external environment in which micro-enterprises operate. Innovation increasingly depends on connectivity: access to universities, technology centers, chambers of commerce, local development agencies, professional consultants, financial institutions, and business networks. Yet micro-enterprises often remain weakly connected to these ecosystems. Their participation in formal innovation networks is limited, and many operate outside collaborative structures that facilitate knowledge exchange, joint problem-solving, or technology diffusion. Research on firm innovation consistently highlights the value of external collaboration and network-based knowledge flows; firms that are more externally engaged tend to exhibit stronger innovation performance. However, micro-enterprises are less likely to benefit from these mechanisms due to time constraints,

low awareness, limited legitimacy, or the perception that institutional programs are designed for larger or more sophisticated firms. (Schøtt & Cheraghi, 2016; Wixe, 2023; Nalmpanti et al., 2024)

University–enterprise collaboration represents a particularly important but underutilized opportunity. Micro-firms may benefit from student projects, applied research, prototyping support, digitalization assistance, and localized innovation consultancy. Nevertheless, systematic research on university collaboration with entrepreneurial micro-firms indicates that such relationships remain relatively underdeveloped and require more tailored engagement models. Traditional technology transfer mechanisms are often built around patents, laboratories, or high-tech ventures, whereas micro-enterprises need simpler, problem-oriented, and low-threshold collaboration formats. (Emerald Publishing, 2025)

Public support policies also generate mixed outcomes. While innovation policies are intended to reduce barriers, micro and small enterprises do not always access them effectively. Application complexity, documentation burdens, lack of awareness, and mismatch between program design and firm capacity may reduce participation. Bittar and Di Serio's study on micro and small enterprises argues that policy support can mitigate innovation barriers, but only when it addresses the actual capability deficiencies of firms and not merely their formal eligibility. In other words, innovation policy must be usable by micro-enterprises, not only theoretically available to them. (Bittar & Di Serio, 2023)

Regulatory burden and uncertainty may further weaken innovation intentions. Micro-enterprises often face proportionally higher compliance costs because they lack dedicated administrative units. New requirements related to taxation, digital invoicing, reporting systems, sustainability expectations, or sector-specific standards may be necessary from a policy standpoint, yet they can also absorb managerial attention and financial resources that might otherwise be directed toward innovation. European policy discussions on competitiveness increasingly acknowledge that smaller firms are especially sensitive to administrative burdens and that simplification is important for preserving their investment capacity. (European Commission, 2025)

Finally, innovation barriers are reinforced by market structures. Micro-enterprises frequently operate in fragmented, price-sensitive, and locally saturated markets where short-term cost competition dominates. In such settings, customers may not immediately reward innovation, and firms may struggle to appropriate the returns of their efforts. This can discourage investments in differentiation, branding, quality improvement, or digital transformation. As a result, the external ecosystem may send contradictory signals: innovation is expected, but the surrounding market may not provide sufficient incentives, support, or protection for micro-scale firms to pursue it confidently.

Taken together, external and ecosystem-based barriers show that micro-enterprise innovation is not solely a firm-level problem. It is also an institutional coordination issue. A micro-enterprise may fail to innovate not because it lacks entrepreneurial ambition, but because it is disconnected from knowledge channels, underserved by support mechanisms, and constrained by a market environment that prioritizes immediate survival over capability development. Therefore, any comprehensive assessment of innovation barriers in micro-enterprises must integrate internal resource limitations with the broader quality of the innovation ecosystem.

4. Toward an Integrated Framework for Understanding Innovation Barriers in Micro-Enterprises

The barriers discussed above suggest that innovation failure in micro-enterprises should not be interpreted as the consequence of a single deficiency, such as inadequate finance or insufficient technology. Rather, it emerges from the interaction of several mutually reinforcing constraints. A micro-enterprise may possess a potentially valuable business idea but lack the financial means to test it; it may receive external support but lack the managerial capacity to absorb and implement it; or it may have a motivated owner-manager but remain disconnected from the networks and institutional mechanisms that facilitate innovation. Therefore, a more comprehensive interpretation is needed—one that considers innovation barriers as a layered and cumulative system rather than as a list of independent obstacles. Recent research on SMEs and micro-enterprises increasingly supports this relational perspective, emphasizing that innovation capacity is shaped by the combined effects of resources, capabilities, external knowledge flows, and ecosystem participation. (Oliveira & Rua, 2025; De la Gala-Velásquez et al., 2025; OECD, 2025)

From this perspective, the innovation difficulties of micro-enterprises can be conceptualized through a four-layer framework: Figure-Oriented Conceptual Logic is given in Fig. 1.

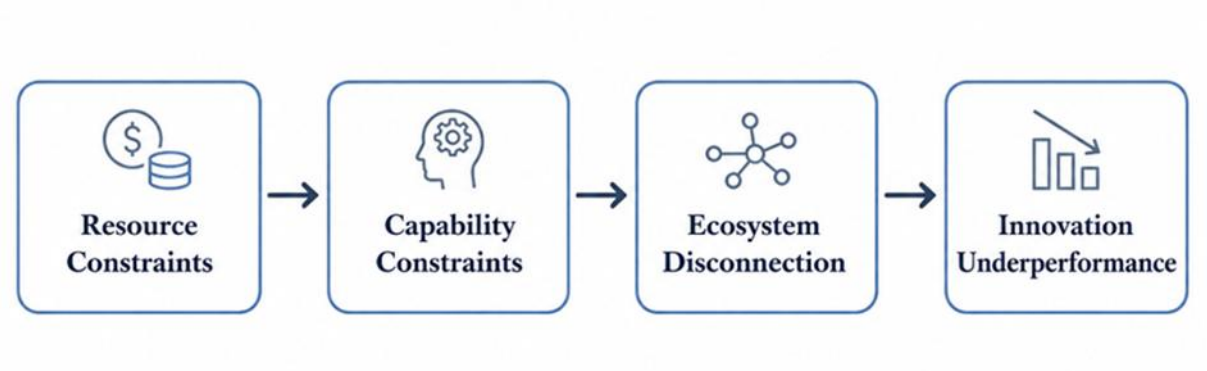

Figure 1. Conceptual Logic of Innovation Barriers in Micrro-Enterprises

This framework argues that the innovation process in micro-enterprises is weakened progressively. The first layer consists of resource constraints, including limited finance, insufficient time, inadequate technological infrastructure, and shortages of skilled labor. These constraints reduce the firm's room for experimentation and make innovation appear costly, uncertain, and secondary to daily survival. The second layer concerns capability constraints, particularly weak strategic planning, owner-centered decision-making, limited absorptive capacity, and an underdeveloped organizational learning culture. Even when some resources are available, micro-enterprises may struggle to convert them into meaningful innovation outcomes unless they possess the ability to recognize opportunities, evaluate external knowledge, and incorporate new practices into their routines. Studies on absorptive capacity and open innovation confirm that the transformation of external information into innovative performance depends on internal interpretive and learning capabilities. (Stawasz, 2021; De la Gala-Velásquez et al., 2025; Rakthin et al., 2024)

The third layer of the framework involves ecosystem disconnection. Innovation does not develop solely inside the firm; it is increasingly generated through interaction with universities, business associations, public support institutions, consultants, technology suppliers, financial actors, and other enterprises. In the case of micro-enterprises, however, these external connections are often weak or sporadic. Oliveira and Rua's study on micro-enterprises shows that innovation ecosystems can function not only as knowledge providers but also as implementers, risk mitigators, and capability builders for open innovation practices. This is a particularly important finding for micro-enterprises, whose risk sensitivity and limited internal capacity often prevent them from innovating independently. Similarly, the OECD's 2025 Science, Technology and Innovation Outlook stresses that an ecosystem perspective is necessary for designing policies capable of broadening participation in innovation and supporting firms beyond traditional sectoral boundaries. (Oliveira & Rua, 2025; OECD, 2025)

The cumulative effect of these three layers is innovation underperformance. This does not necessarily mean that micro-enterprises are entirely non-innovative; rather, their innovations tend to remain informal, reactive, fragmented, and difficult to scale. Instead of following a systematic pathway from idea generation to implementation and learning, many micro-enterprises respond to immediate pressures through isolated adjustments. These responses may help them survive in the short term, but they rarely create sustained competitive advantage. The absence of a structured innovation process limits the firm's capacity to develop new products, redesign business models, adopt advanced digital tools, or benefit from collaborative opportunities. Recent studies on innovation barriers in SMEs likewise show that fragmented interventions are less effective than integrated approaches that address multiple constraints simultaneously. (Wojtaszek et al., 2025; Oliveira & Rua, 2025; OECD, 2025)

A key contribution of this integrated framework is that it reveals the interdependency among barriers. Financial support, for instance, may have limited impact if a micro-enterprise lacks the managerial expertise to select the right technology or prepare a viable innovation project. Training programs may not generate strong outcomes if entrepreneurs lack time to participate or if the firm operates in an ecosystem that offers few opportunities for collaboration. Likewise, network-based innovation initiatives may exclude micro-enterprises unless application processes are simplified and intermediary institutions actively facilitate participation. In this sense, the framework

suggests that innovation barriers are not merely additive; they are interactive. One barrier amplifies another, and the combined effect is greater than the sum of individual constraints. This systemic view is consistent with contemporary innovation policy debates, which increasingly call for coordinated, ecosystem-based interventions rather than isolated financial or technological measures. (OECD, 2025; Oliveira & Rua, 2025)

The framework also helps clarify why micro-enterprises should not be treated simply as smaller versions of SMEs. Their innovation difficulties are structurally more concentrated and personally mediated. In a medium-sized enterprise, financial management, digitalization, human resources, and market development may be distributed across several professionals. In a micro-enterprise, these responsibilities frequently converge on the owner-manager. Consequently, the firm's learning capacity, innovation orientation, network participation, and willingness to seek external support are deeply shaped by one person's time, mindset, and competencies. This distinctive feature reinforces the need for policy and support mechanisms specifically tailored to the micro scale, rather than programs designed generically for the SME category as a whole. Research focused on micro-enterprises emphasizes that their innovation potential depends strongly on carefully designed external support structures capable of compensating for internal limitations without imposing excessive administrative burdens. (Oliveira & Rua, 2025; Bittar & Di Serio, 2023)

In light of these arguments, the proposed framework provides a conceptual basis for interpreting micro-enterprise innovation barriers under four interrelated dimensions: (Öz & Alimova, 2026).

Input Deficiency: lack of finance, time, labor, and technology

Capability Weakness: limited strategic management, absorptive capacity, and learning routines

Ecosystem Fragility: weak networking, institutional exclusion, and low access to support mechanisms

Innovation Underperformance: reactive, fragmented, and low-scalability innovation outcomes

This framework can serve two purposes. Analytically, it offers a structured lens for future empirical studies examining the determinants of innovation in micro-enterprises. Practically, it provides a foundation for policy recommendations that move beyond the assumption that innovation deficits can be solved through funding alone. If micro-enterprises are to become more innovative, they require a complementary support architecture that simultaneously strengthens resources, capabilities, and ecosystem integration. The concluding section therefore builds on this integrated perspective and presents policy and managerial recommendations for reducing innovation barriers at the micro-enterprise level.

5. Conclusion and Policy/Managerial Implications

Micro-enterprises occupy a critical position in economic life due to their numerical prevalence, local embeddedness, employment contribution, and entrepreneurial dynamism. Yet, despite their significance, they often remain the least visible and least supported actors within innovation ecosystems. This study has argued that innovation in micro-enterprises should not be narrowly associated with high-technology investments, formal R&D departments, or patent-oriented outputs. Instead, it should be understood as a broader adaptive capability that may emerge through incremental improvements in products, processes, customer relations, digital channels, organizational routines, and business models. In increasingly competitive and volatile markets, such innovation is no longer optional; it has become a basic requirement for survival, resilience, and long-term relevance. (OECD, 2024a; OECD, 2024b; OECD, 2025)

The analysis demonstrates, however, that the need for innovation does not automatically translate into the capacity to innovate. Micro-enterprises face a distinctive constellation of barriers that are more concentrated and more personally mediated than those experienced by larger firms. Resource limitations—especially finance, time, skilled labor, and technological infrastructure—reduce the room for experimentation. Managerial and organizational weaknesses—such as owner-centered decision-making, low strategic planning capacity, high risk sensitivity, and limited absorptive capacity—make it difficult to transform available knowledge into innovative practices. External and ecosystem-based deficiencies—weak institutional networks, insufficient university–enterprise collaboration, difficulties in accessing public support mechanisms, and regulatory burdens—further deepen the innovation gap. These findings confirm that innovation constraints in micro-enterprises are not isolated impediments, but a mutually reinforcing structure of disadvantages. (Bittar & Di Serio, 2023; Stawasz, 2021; Oliveira & Rua, 2025)

The integrated framework proposed in this study—resource constraints, capability constraints, ecosystem disconnection, and innovation underperformance—provides a conceptual lens for understanding this layered

problem. The framework highlights that interventions targeting only one dimension are likely to remain insufficient. Financial support may fail when entrepreneurs lack project development skills; training may have limited results when owners have no time or institutional motivation to participate; digitalization programs may produce fragmented adoption if firms are not supported in redesigning their business practices. Therefore, strengthening innovation in micro-enterprises requires a coordinated and multi-dimensional policy perspective. The central implication is clear: micro-enterprise innovation policy should move from isolated support instruments toward integrated capability-building architectures.

From a public policy perspective, the first priority should be the development of support programs specifically designed for the realities of micro-enterprises rather than broadly defined SME packages. Micro firms often lack the administrative capacity to navigate complex application procedures, prepare detailed project files, or follow multi-stage incentive mechanisms. Innovation support should therefore be simplified, modular, and accessible through low-bureaucracy instruments. Small-scale innovation vouchers, micro-digitalization grants, local mentoring programs, rapid diagnostic tools, and one-stop advisory platforms may be more effective than highly formalized support schemes. In addition, public institutions should recognize that micro-enterprises need not only funding, but also guidance in problem definition, technology selection, market adaptation, and business model development. (Bittar & Di Serio, 2023; OECD, 2025)

A second policy priority concerns local and regional innovation ecosystems. Chambers of commerce, development agencies, municipalities, vocational institutions, technoparks, universities, and business associations should take a more active role in connecting micro-enterprises with innovation opportunities. Rather than expecting micro-enterprises to enter complex institutional structures on their own, ecosystem actors should design outreach-based, problem-oriented support models. University–micro-enterprise collaboration can be particularly valuable when it takes forms suited to the micro scale: short applied consultancy projects, student-supported digital audits, local product development workshops, customer analytics support, and prototype or branding assistance. These low-threshold forms of cooperation may help firms overcome the initial distance between academic knowledge and everyday business practice. (Oliveira & Rua, 2025; Stawasz, 2021)

From a managerial standpoint, micro-enterprise owners should be encouraged to redefine innovation as a manageable and continuous practice rather than a costly, large-scale transformation. The most immediate innovation opportunities may arise from systematic observation of customer complaints, repeated operational inefficiencies, unused digital tools, changing market expectations, or new collaboration possibilities. Owner-managers do not necessarily need to begin with radical technological investments; they can initiate innovation through small experiments, data-informed decisions, service redesign, online visibility, after-sales improvements, or collaborations with nearby enterprises. What matters is the establishment of a learning-oriented mindset in which improvement becomes part of the routine functioning of the business. This approach is especially important because absorptive capacity in micro-enterprises is closely tied to the owner's ability to recognize and act upon external knowledge. (Stawasz, 2021; Carrasco-Carvajal et al., 2023)

Another managerial implication is the need to reduce excessive dependence on intuition alone. Entrepreneurial instinct is valuable, but innovation becomes more sustainable when supported by simple forms of planning and measurement. Micro-enterprises can benefit from basic innovation roadmaps, customer feedback records, small digital performance indicators, and periodic reviews of products, pricing, delivery methods, and market positioning. Even modest levels of formalization may help convert isolated ideas into repeatable improvement practices. In this regard, training programs for micro-enterprise owners should focus less on abstract innovation terminology and more on practical capabilities: identifying business problems, using simple digital tools, engaging in low-cost market tests, and building external networks.

The study also points toward a broader developmental implication. A country's innovation system cannot be considered inclusive if its smallest enterprises remain structurally detached from it. Micro-enterprises are often located in local economies, traditional sectors, family businesses, and neighborhood-based commercial structures. When these firms remain stagnant, the productivity gap deepens; when they are supported to innovate, the benefits may spread through employment, local resilience, supply-chain diversification, and regional competitiveness. Therefore, supporting micro-enterprise innovation is not merely a matter of firm-level efficiency; it is also a question of inclusive economic transformation. (OECD, 2024a; OECD, 2025)

This study is conceptual in nature and does not test the proposed framework empirically. Future research may therefore examine the relative weight of resource-based, managerial, and ecosystem-based barriers through survey designs, Delphi studies, AHP-based prioritization, or sector-specific comparative analyses. It would be particularly valuable to investigate whether innovation barriers differ across retail, manufacturing, creative industries, food services, and digitally mediated micro-enterprises. Comparative research between countries or regions could also reveal how institutional quality and policy design shape innovation capacity at the micro level. In addition, future studies may explore the role of artificial intelligence tools, digital platforms, and low-cost automation technologies in reducing or, conversely, reproducing innovation inequalities among miicro firms.

In conclusion, micro-enterprises should not be viewed as peripheral participants in innovation policy, but as essential actors whose transformation will significantly influence the inclusiveness and resilience of future economies. Their innovation potential exists, but it is constrained by a dense web of financial, managerial, and ecosystemic limitations. Overcoming these barrriers requires a shift in perspective: from asking why micro-enterprises fail to innovate, to asking how institutions, policies, and entrepreneurial practices can jointly create the conditions under which they are able to do so. When this shift is achieved, innovation may cease to be a privilege of scale and become a realistic pathway for the smallest enterprises as well.

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