

Understanding Innovation in Small Firms: A Systematic Literature Review of Heterogeneity in Definitions, Drivers, and Measurement

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Article Info

Article history:

Received June, 2026

Revised Aug, 2026

Accepted Aug, 2026

Keywords:

Systematic Literature Review

Innovation

Small Firms

Heterogeneity

Definitions

Drivers

Measurement

ABSTRACT

Innovation in small firms is widely recognized as a critical driver of economic growth and competitiveness, yet its conceptualization and measurement remain highly fragmented. This paper addresses this gap by conducting a systematic literature review of 367 studies on innovation in small firms across diverse geographical and institutional contexts. Drawing on the resource-based view and institutional theory, the study examines how small firms are defined, how their innovation activities are characterized, and how such activities are measured in the existing literature. The findings reveal substantial heterogeneity in the definition of small firms, with significant variation across countries, datasets, and registration status. The analysis further shows that innovation in small firms is predominantly incremental, necessity-driven, and often takes the form of frugal and informal practices, particularly in resource-constrained environments. However, widely used indicators such as patents and R&D expenditure largely capture formal innovation and therefore systematically underestimate the innovative activities of small firms. The paper identifies a critical measurement gap between actual innovation practices and their empirical representation. By highlighting this misalignment, the study contributes to the literature by demonstrating the limitations of conventional innovation metrics and emphasizing the need for more inclusive and context-sensitive measurement frameworks. The findings have important implications for both researchers and policymakers, suggesting that current approaches may overlook a significant portion of innovation activity in small firms, particularly in emerging economies.

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1. INTRODUCTION

Despite widespread recognition that small firms play a critical role in driving innovation, there remains no coherent framework for defining, measuring, or comparing their innovative activity across

contexts. Early work by [1] emphasized the role of entrepreneurial firms in creative destruction, while subsequent empirical studies [2]–[4] demonstrated that small firms are important sources of innovation,

particularly in knowledge-intensive and emerging sectors. However, substantial ambiguity persists regarding how innovation in these firms is conceptualized and empirically captured. In particular, definitions of what constitutes a “small firm” vary significantly across datasets, institutional settings, and country contexts [5]–[7], creating fundamental challenges for comparison and generalization across studies.

Although small firms contribute disproportionately to employment and economic dynamism worldwide [8], [9], their innovation processes differ markedly from those of large firms due to resource constraints, limited absorptive capacity, and restricted access to formal institutions. In emerging economies, these constraints often give rise to adaptive and context-specific innovation strategies. Rather than relying on formal R&D, innovation in small firms frequently spans a continuum from incremental improvements and process adaptations to frugal, grassroots, and necessity-driven solutions [10]–[12]. In resource-constrained settings such as India, frugal innovation commonly referred to as “jugaad” represents an alternative paradigm that emphasizes affordability, flexibility, and resource efficiency [13]; [14]; [15]. A growing body of literature recognizes that small firms are active innovators, particularly in dynamic and uncertain environments. However, the extent and nature of their innovation activity vary considerably within the small-firm category itself, reflecting differences in firm size, sector, capabilities, and institutional embeddedness [16]–[18]. Their innovation processes are typically incremental, interactive, and user-driven, relying heavily on experiential learning and informal networks rather than formal R&D systems [19]–[22]. At the same time, these processes are shaped by a combination of internal capabilities and external conditions, including access to finance, human capital, market structure, and institutional quality [23]–[25].

Despite these advances, three critical gaps remain in the literature. First, the absence of a standardized definition of small firms across countries and datasets introduces

significant heterogeneity, limiting the comparability and cumulative development of knowledge [5], [7]. Second, dominant innovation indicators such as patents and R&D expenditure are biased toward formal, technology-intensive activities and systematically underestimate innovation in small firms, particularly in informal and developing economy contexts [26]–[28]. This raises important questions about how the heterogeneity of innovation in small firms can be more accurately captured using alternative measures, including non-technological, organizational, and process innovations. Third, there is a lack of systematic synthesis examining how innovation drivers and patterns vary across industries, regions, and institutional environments, particularly in the Global South [29], [30].

To address these gaps, this study is guided by four key questions: *how small firms are defined across different empirical contexts; the extent to which they engage in innovation across heterogeneous firm types; the factors that drive such innovation across industries and geographies; and the measures used to capture its diverse forms.* The study draws on the resource-based view [31], [32] and institutional theory [24], [33], to explain how internal resource constraints and external institutional environments jointly shape innovation practices and their measurement. Building on these perspectives, the paper conducts a systematic literature review of 367 studies on innovation in small firms.

The study makes three key contributions. First, it demonstrates that definitional inconsistencies create significant comparability challenges in the literature. Second, it shows that innovation in small firms is predominantly incremental, necessity-driven, and frugal, rather than formal and R&D-intensive. Third, it reveals a systematic measurement bias, whereby conventional indicators fail to capture informal, adaptive, and context-specific innovation practices. By addressing these gaps, the paper contributes to a more comprehensive and context-sensitive understanding of innovation in small firms,

particularly in developing and emerging economies.

2. METHODS

This study employs a systematic literature review (SLR) to synthesize existing research on innovation in small firms. The review follows PRISMA guidelines to ensure transparency, rigor, and reproducibility [34]. By applying explicit criteria for study selection, screening, and analysis, the SLR approach minimizes bias and enhances the reliability of findings [35].

2.1 Data Sources and Search Strategy

To ensure systematic and comprehensive coverage, a structured search strategy was adopted. A preliminary scoping exercise was conducted to refine the search terms and identify relevant keywords. Based on this, a Boolean search string was developed:

("innovation" OR "frugal innovation" OR "process innovation" OR "product innovation") AND ("small firms" OR "SMEs" OR "startups")

The search was conducted using two electronic databases Scopus and Google Scholar to capture both peer-reviewed and gray literature. The inclusion criteria were: (i) articles published in English, (ii) publication period between 1998 and 2025, and (iii) a primary focus on innovation in small firms. Exclusion criteria included duplicate records, non-English publications, studies outside the specified period, and those not directly relevant to the research questions.

2.2 Study Selection

The study selection process followed PRISMA guidelines (Figure 1). A total of 2,200 records were initially identified from Google Scholar and Scopus. After removing 102 duplicate records, 2,098 studies were screened

based on titles, abstracts, and keywords, resulting in the exclusion of 1,654 records. The remaining 444 full-text articles were assessed for eligibility, of which 77 were excluded based on relevance and quality criteria. This resulted in a final sample of 367 studies for analysis.

2.3 Data Extraction and Analysis

A structured data extraction process was employed to systematically code the selected studies. Key variables extracted from each study included: (i) definition of small firms, (ii) type of innovation, (iii) drivers of innovation, (iv) measurement indicators, (v) geographical context, and (vi) firm characteristics (e.g., size, sector, registration status).

The analysis was conducted in two stages. First, descriptive statistics were used to examine the distribution of studies across firm size, geography, and time. Second, a thematic analysis was conducted to identify recurring patterns related to definitional heterogeneity, innovation behavior, key drivers, and measurement approaches.

The thematic analysis followed an iterative coding process, where studies were categorized based on emerging themes aligned with the research questions. This approach allowed for the identification of both dominant patterns and context-specific variations in innovation practices among small firms.

2.4 Quality Assessment

To ensure the reliability of the findings, each study was evaluated based on three criteria: (i) clarity of research design, (ii) robustness of data sources, and (iii) relevance to the research questions. Studies that lacked methodological transparency or were not directly aligned with the objectives of the review were excluded during the full-text screening stage.

Indian firms (150 small firms; 146 large firms), whereas only 71 studies examine Indian firms (40 small firms; 31 large firms). This indicates

a pronounced geographical imbalance, highlighting the underrepresentation of Indian small firms in the literature.

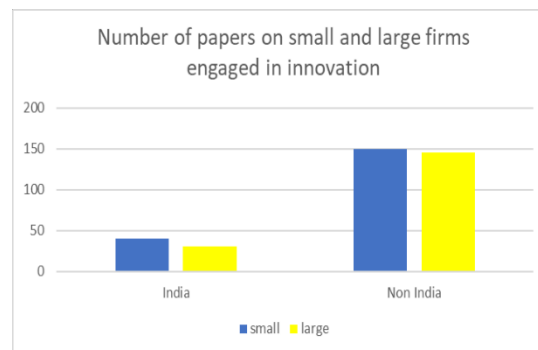


Figure 3. Number of Papers on Small and Large Firms Engaged in Innovation

Figure 3 illustrates the dominance of non-Indian studies across both firm categories, reinforcing the need for more context-specific research on innovation in India.

Figure 4 presents the annual publication trends between 1998 and 2025. The early years (late 1990s to early 2000s)

show low and fluctuating publication activity. A clear upward trend emerges from 2010 onward, with publication counts reaching a peak in recent years. This pattern indicates a growing academic interest in innovation research, particularly concerning small firms and emerging economies.

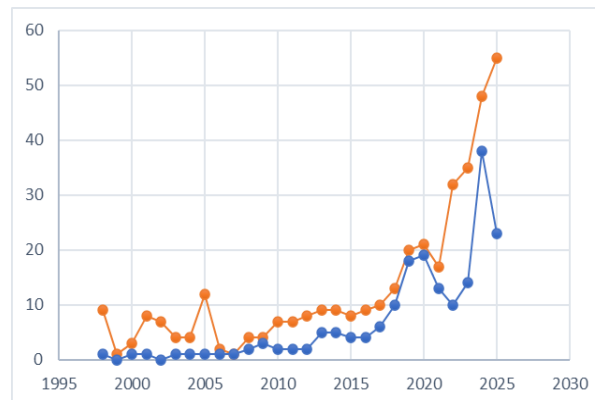


Figure 4. Yearly Publication Trends

Figure 5 present the distribution of studies across journals. Research Policy leads with 22 publications (6% of the dataset), followed by Small Business Economics and Technovation (9 each; 2.4%). The remaining journals show a lower but consistent representation across the dataset.

This distribution highlights both the prominence of innovation and entrepreneurship research in leading journals and the interdisciplinary nature of the field, spanning management, economics, and sustainability studies.

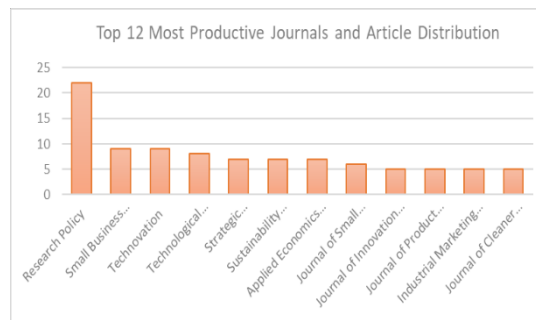


Figure 5. Top Journals Publishing Innovation Research

The descriptive statistics reveal three main insights:

A strong geographical skew toward non-Indian contexts, indicating a research gap in emerging economies.

A sustained increase in publications over time, reflecting growing academic interest in small-firm innovation.

Concentration of studies in a relatively small set of journals, highlighting key outlets for innovation research.

3. RESULTS AND DISCUSSION

3.1 Definitional Heterogeneity of Small Firms

This section addresses the first research question by examining how small firms are defined across different datasets, institutional contexts, and measurement approaches.

Firm size heterogeneity remains a central challenge in the study of small firms, particularly in the Indian context, where no single standardized definition exists. The evidence points to a fragmented landscape in which multiple criteria are used to classify small firms, reflecting differences in data availability, institutional frameworks, and research objectives.

Across the literature, firm size is measured using a range of indicators, highlighting significant variation in methodological approaches. As shown in Figure 6, the most commonly used measure in India is the number of employees (53%), followed by investment in plant and machinery/equipment (25%) and total assets of the firm (14%). Revenue and total sales are used only marginally (4% each).

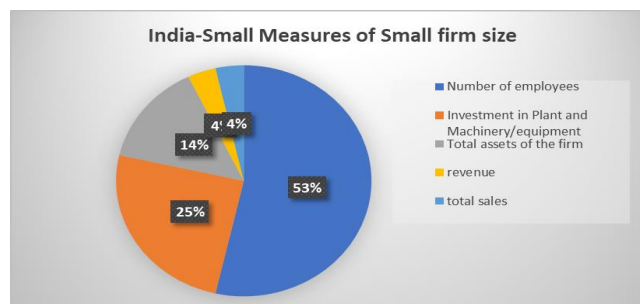


Figure 6. India-Small Measures of Small Firm Size

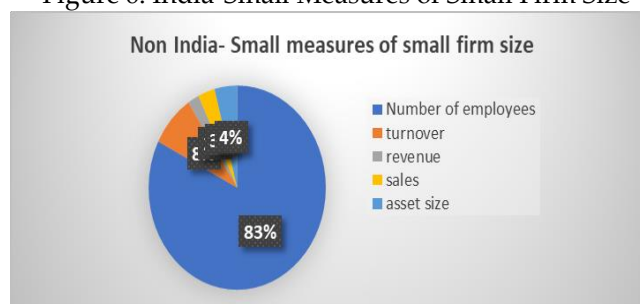


Figure 7. non-Indian- Small measures of Small Firm Size

An important dimension of this heterogeneity is the distinction between registered and unregistered firms. Registered firms, which are part of the formal economy, are typically captured in administrative and financial datasets. As a result, studies based on these firms tend to rely on financial and asset-based indicators such as investment in plant and machinery/equipment and total assets. These measures reflect both reporting requirements and the legacy of MSME policy frameworks that emphasize capital investment. In contrast, unregistered firms operate largely within the informal sector, where reliable financial data are often unavailable. Consequently, studies using unregistered data overwhelmingly rely on employment size as a practical and observable proxy for firm size. This divergence highlights how data constraints shape measurement choices and underscores that firm size may capture different underlying dimensions i.e., capital in formal firms versus labour in informal firms.

Figure 7 extends this comparison to non-Indian contexts and shows that definitional heterogeneity is not unique to India. Globally, the number of employees remains the dominant criterion, accounting for 83% of definitions. Other indicators such as turnover (8%), revenue (3%), sales (2%), and asset size (4%) are used far less frequently.

A similar pattern emerges when distinguishing between registered and

unregistered firms outside India. Registered firms are typically captured in formal datasets and are therefore more likely to be defined using financial and asset-based indicators such as investment in plant and machinery, total assets, turnover, or revenue. These measures reflect both regulatory reporting requirements and the influence of formal policy frameworks. In contrast, unregistered firms often operating in the informal sector face significant data constraints, as reliable financial information is rarely available. As a result, studies on unregistered firms predominantly rely on the number of employees as a proxy for firm size due to its simplicity and observability. This divergence in measurement approaches not only reflects differences in data availability but also introduces challenges for comparability, as firm size classifications may capture fundamentally different dimensions of economic activity across formal and informal sectors.

Among unregistered firms, employment size is the most widely used measure (45 instances), reflecting its accessibility in data-constrained environments. Other indicators, including turnover (5), sales (3), and asset size (1), are used infrequently, while revenue is not used at all. For registered firms, employment remains dominant (35 studies), followed by smaller contributions from turnover (3), revenue (2), and asset size (3).

Table 2. Measurement Criteria for Small Firms

Measurement Criteria	India Small (registered)	India Small (unregistered)	Non-India Small (registered)	Non-India Small (unregistered)
Investment in Plant and Machinery/equipment	4	3	0	0
Total assets of the firm	3	0	3	1
Revenue	1	0	2	0
Total sales	1	0	0	3
Number of employees	1	14	35	45
Turnover	0	0	3	5

Table 2 further illustrates these differences across contexts. Several key patterns emerge:

India (Registered Firms): Measurement is primarily based on investment in plant and machinery/equipment, reflecting the legacy of

MSME policy frameworks. Total assets are used less frequently, while revenue-based measures are rare.

India (Unregistered Firms): Employment size dominates due to the limited availability of reliable financial data in informal firms.

Non-India (Registered and Unregistered Firms): Employment remains the most common metric across both categories, although revenue-based indicators such as turnover and total sales are more prevalent than in India.

Revenue and Sales in India: These measures are seldom used, and turnover is entirely absent, suggesting both data constraints and the continued influence of capital-based classification systems.

Overall, the findings highlight the absence of a uniform standard for defining small firms. Measurement choices vary systematically across country contexts, registration status, and data availability, which poses significant challenges for cross-study comparability and policy design. These

inconsistencies may lead to differences in how firm performance, productivity, and innovation are interpreted across empirical studies.

Having established the heterogeneity in firm size definitions, the next section examines how these firms engage in innovation.

3.2 Innovation

This section addresses the second research question by analysing the extent and nature of innovation in small firms across different contexts.

The systematic review of 367 papers provides strong evidence that innovation is widespread across firms of all sizes and regions. As shown in Table 3, a high proportion of firms' report engaging in innovation activities, with 95% of small firms in both Indian and non-Indian contexts reporting innovation. Corresponding figures for large firms are even higher, reaching 98% in non-Indian contexts and 100% in India.

Table 3. Innovation statistics

Firm Type	% Reporting Innovation	Frugal Innovation	Financial Constraint
Small Firms (India)	95%	52%	67%
Small Firms (Non-India)	95%	61%	60%
Large Firms (Non-India)	98%	60%	74%

However, closer examination reveals qualitative differences in the nature and drivers of innovation. One notable pattern is the prevalence of frugal innovation, particularly among small firms. While 52% of small firms in India engage in frugal innovation, the figure rises to 61% for small firms outside India. This indicates that frugal innovation, although strongly associated with resource-constrained environments like India, is also widely adopted globally as a strategic response to cost pressures and competitive markets. Interestingly, large firms also report substantial engagement in frugal innovation (60% in non-India and 54% in India), suggesting that frugality has

become an important innovation paradigm across firm sizes.

Financial constraints emerge as a critical limiting factor, particularly for small firms. In India, 67% of small firms report financial constraints, compared to 60% in non-Indian contexts. This underscores the structural challenges faced by small firms in accessing formal finance, which can restrict their ability to invest in innovation. Notably, financial constraints are also high among large firms, especially in India (87%), indicating that these barriers are systemic, though their impact is more severe for smaller firms with limited internal resources.

Despite these empirical patterns, the broader literature consistently emphasizes

the critical role of small firms in innovation ecosystems. [36] argue that small firms contribute disproportionately to technological advancement due to their agility and responsiveness. [3] highlights that smaller firms are often more inclined toward radical innovation, driven by the need to differentiate and adapt quickly. Their flat organizational structures and flexibility enable faster decision-making and rapid adoption of new technologies [37]. [38] further notes that small firms excel in user-driven innovation, developing solutions closely aligned with customer needs. Frameworks such as regional innovation systems and open innovation [39], [40], suggest that small firms can overcome internal resource constraints through collaboration with external actors.

In contrast, large firms benefit from their ability to undertake sustained R&D investments. [21] introduce the concept of absorptive capacity, highlighting that larger firms are better equipped to identify and exploit external knowledge. [41] similarly argues that large firms, due to their scale, capital, and infrastructure, are well-positioned to drive and commercialize innovation. Empirical studies [42] support this view, showing that large firms are capable of conducting complex, large-scale R&D activities. Innovation in large firms is typically supported by formal structures, dedicated R&D units, and systematic experimentation processes [43], [44].

Both Indian and international evidence confirms that small firms innovate, albeit in distinct ways. In India, [45] report that 35.2% of SMEs in manufacturing engage in innovation, with medium-sized firms exhibiting higher intensity than micro and small firms. Over 70% of innovations are product- or process-oriented, largely necessity-driven, focusing on cost reduction, efficiency, and compliance. Persistent constraints especially in finance, skilled labor, and infrastructure limit innovation potential.

Other studies highlight the adaptive nature of small firm innovation. [46] document sustainability-oriented innovations among MSMEs, while [47] emphasizes the

role of entrepreneurial leadership and internal capabilities. [48] find that enabling environments characterized by financial access, organizational flexibility, and competitive pressures enhance innovation among small firms. Conversely, high employee turnover, reliance on informal finance, and competition from unregistered firms can hinder innovation.

[49] shows that innovation propensity generally increases with firm size, but micro firms often exhibit higher innovation tendencies than small firms, though these innovations are typically incremental rather than radical. Micro and small firms focus on adapting existing technologies, improving product quality, and firm-level innovations, driven by survival and competitiveness rather than long-term strategic expansion.

Large firms in India operate within more structured, resource-rich innovation systems. Studies such as [50] demonstrate how large firms institutionalize frugal innovation through scale and R&D infrastructure. [51] highlight the role of ICT and data-driven capabilities, while [52] show that FDI spillovers disproportionately benefit large firms. These findings underscore an innovation gap between firm sizes, with large firms benefiting from formal support and global linkages, while small firms rely more on informal, experience-based knowledge systems.

International evidence reinforces these patterns. Small firms often engage in open and network-based innovation, leveraging customer and supplier relationships [53], [54] and adapting to technological changes such as Industry 4.0 [55]. Programs like the U.S. SBIR demonstrate that small firms perform well when supported by external collaboration and innovation autonomy [56]. In contrast, large firms tend to rely on structured R&D systems, patenting, and long-term strategic investments [57].

The relationship between competition and innovation is nuanced. [58] identify an inverted-U relationship, where moderate competition stimulates innovation, while excessive competition may reduce incentives,

particularly for firms near the technological frontier. Large firms benefit from leadership, coordination, and market orientation [59], [60], though they may face inertia and slower decision-making.

Overall, while regression results may indicate a lower likelihood of innovation among small firms, this does not imply an absence of innovation. Rather, it reflects differences in the nature, scale, and measurement of innovation. Small firms engage in incremental, frugal, and context-specific innovation, often driven by necessity and resource constraints, whereas large firms pursue formal, R&D-intensive, and scalable innovation strategies. Differences in innovation across firm sizes are primarily related to scale, structure, and measurement rather than the presence or absence of innovation, which is critical for interpreting empirical results and designing targeted policies.

3.3 Drivers

This section addresses the third research question by identifying the key drivers of innovation in small firms across industries and regions. The literature indicates that innovation in small firms is largely driven by necessity, competitive pressure, resource constraints, institutional support, and contextual factors, rather than purely strategic or growth-oriented motives.

A central driver is necessity-driven innovation, particularly in developing economies [61], in his study of small manufacturing firms in Bangalore, shows that innovation is often a response to survival pressures rather than ambition. Firms innovate to cope with rising competition, shifting customer preferences, increasing input costs, and exposure to global markets following liberalization. In such contexts, innovation tends to be incremental, focusing on cost efficiency, quality improvement, and customer responsiveness. Supporting this, [62] find that innovation significantly enhances firm survival, especially during economic uncertainty, reinforcing its role as a defensive mechanism.

Closely related is competitive pressure as a key driver of innovation. [63] highlights that Indian SMEs operate under intense competition from larger firms, making innovation a strategic necessity. Network analysis (Figure 8) further supports this, identifying competition as a central node influencing innovation. This aligns with [1] concept of *creative destruction*, where firms must continuously innovate to remain relevant. [64] “Red Queen effect” similarly suggests that firms must constantly adapt simply to maintain their market position.

Resource constraints also play a crucial role, often leading to frugal and informal innovation. [45] show that SMEs focus on outcomes such as productivity gains, regulatory compliance, and cost reduction, frequently without formal innovation systems. Several literatures further demonstrate that informal sector firms rely on tacit knowledge, local learning, and low-cost experimentation. These innovations, though often unrecognized formally, are essential for survival in resource-constrained environments.

Sectoral dynamics further shape innovation behavior. [63] notes that labor-intensive sectors such as textiles prioritize process innovation for cost control, whereas knowledge-intensive sectors like IT and pharmaceuticals emphasize product innovation. [65] finds that in traditional industries, small firms often rely on non-technological innovations, including organizational and marketing changes. Similarly, some papers observe that innovation in Indian manufacturing SMEs is typically incremental and experience-based rather than driven by formal R&D.

At the firm level, organizational characteristics and capabilities significantly influence innovation. [61] emphasizes the role of entrepreneurial leadership, internal technical capabilities, and managerial agency. Older and medium-sized firms often possess advantages due to accumulated experience and resources. However, [36] argue that small firms remain important contributors to innovation due to their flexibility and responsiveness.

Beyond firm-level factors, institutional and policy support is critical. [66] argue that government intervention shapes innovation behavior, particularly where market failures exist. [67] and [4] highlight the importance of public R&D support and knowledge spillovers, while [21] stress the role of such support in enhancing firms' absorptive capacity.

In the Indian context, policy initiatives have played a significant role. [68] underscores the contribution of public R&D institutions and fiscal incentives in building technological capabilities. [69] show that schemes such as the Technology Upgradation Fund Scheme (TUFS) have improved innovation outcomes in manufacturing. More recent initiatives, including Startup India, Make in India, and the Atal Innovation Mission [70], have strengthened the innovation ecosystem by improving access to finance, incubation, and institutional support. These measures are particularly important for small firms that lack internal resources and depend on external support for innovation.

Building on these observed patterns, this section has focused on the underlying drivers rather than the nature of innovation itself. Given the diversity of these drivers, an important question arises regarding how such varied forms of innovation are measured, which is examined in the next section.

3.4 Measurement

This section addresses the fourth research question by examining the indicators used to measure innovation and their implications for capturing heterogeneity in small firms.

A central challenge in synthesizing the literature on small-firm innovation lies in the measurement of the dependent variable itself. The 367 studies included in this review employ diverse indicators, reflecting differing assumptions about what constitutes innovation and whose innovation is recognized. This heterogeneity complicates cross-study comparisons and shapes which firms are identified as innovative, thereby influencing both academic conclusions and policy priorities. This section critically evaluates the measurement landscape, with particular attention to the divergence between formal and informal innovation metrics across firm sizes and geographical contexts.

3.5 Dominance of Product and Process Innovation

Across all contexts, product and process innovation emerge as the most widely used indicators. Among small firms in India, process innovation appears in 15 studies and product innovation in 14 (Figure 9). In non-Indian contexts, product innovation is used in 42% of studies and process innovation in 29% (Figure 10). This dominance reflects alignment with standardized frameworks such as the Oslo Manual [28], which provide clear and operationalizable definitions.

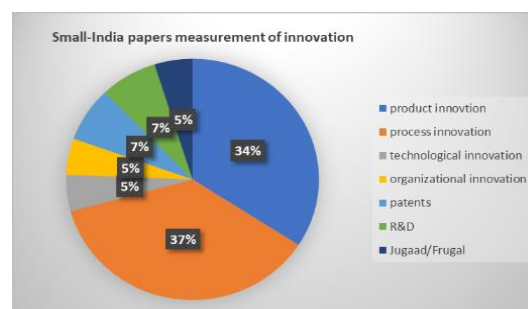


Figure 9. Small-India Measurement of Innovation

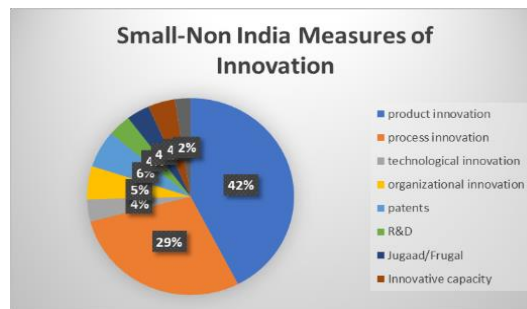


Figure 10. Small Non-Indian Measurement of Innovation

However, this consistency in measurement masks important qualitative differences. In small firms, product and process innovations are typically incremental, involving adaptations, modifications, and efficiency improvements. In contrast, in large firms, these same indicators often capture more complex, R&D-intensive, and market-expanding innovations. Thus, while the terminology remains uniform, the underlying nature of innovation varies significantly across firm sizes an issue that is rarely acknowledged.

3.6 Divergence in Formal Innovation Measures

A clear divergence emerges in the use of formal innovation indicators across firm types and contexts. Patents, a conventional proxy for innovation, are used in only three studies of small Indian firms, compared to 44 studies of large non-Indian firms (Figure 11) and nine studies of large Indian firms (Figure 12). Similarly, R&D expenditure appears infrequently in studies of small firms but is more common in analyses of larger firms.

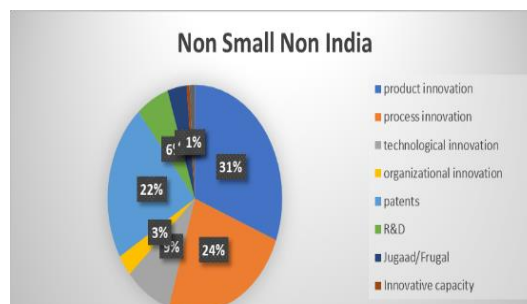


Figure 11. Large-non-Indian Measurement of Innovation

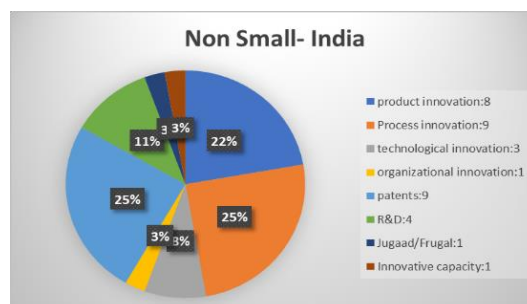


Figure 12. Large-India Measurement of Innovation

This disparity reflects structural constraints rather than differences in innovative activity. Small firms particularly informal or unregistered ones often lack the financial resources, legal capacity, and

institutional access required for patenting or formal R&D investment. Their innovations are more likely to be incremental and embedded in practice, relying on mechanisms such as secrecy, learning-by-doing, and first-

mover advantages. Consequently, reliance on patents and R&D as primary indicators systematically underestimates innovation in small firms and biases research toward formal sector activities.

3.7 The Missing Measure: Frugal and Jugaad Innovation

One of the most significant gaps identified in this review is the limited measurement of frugal (or Jugaad) innovation. Despite its conceptual relevance in resource-constrained environments [13], it is explicitly measured in only two studies of small Indian firms and six studies of small non-Indian firms.

This underrepresentation is striking. Descriptive evidence suggests that 52–61% of small firms engage in frugal innovation, yet few studies capture it systematically. In many cases, such innovation is subsumed under product or process categories, obscuring its distinctive features such as affordability, simplicity, and resource efficiency. As a result, a significant dimension of innovation in small firms remains analytically invisible.

3.8 Synthesis: Toward More Inclusive Measurement

Tables 4 summarize the distribution of innovation measures across firm types and contexts.

Table 4. Innovation Measurement

Measurement Indicator	Small Firms (India)	Small Firms (Non-Indian)	Large Firms (India)	Large Firms (Non-Indian)
Product Innovation	14	42	8	61
Process Innovation	15	29	9	47
Patents / IPR	3	10	9	44
R&D Expenditure	3	6	4	12
Technological Innovation	2	6	3	17
Organizational Innovation	2	9	1	6
Frugal / Jugaad Innovation	2	6	1	7
Innovative Capacity	0	7	1	1

Three key conclusions emerge. First, measurement is not neutral: the dominance of product and process indicators reflects and reinforces a formal, standardized often Western-oriented understanding of innovation, which may not adequately capture the adaptive and necessity-driven practices of small firms.

Second, context matters. The limited use of patents and R&D indicators among small firms reflects structural and institutional constraints rather than an absence of innovation. Measurement choices must therefore be interpreted within their specific economic and institutional contexts.

Third, there is a clear need for more inclusive measurement frameworks. Future research should develop indicators that capture informal, incremental, and frugal

innovation more explicitly. Moving beyond binary measures toward more nuanced and multidimensional approaches potentially supported by mixed-method designs would provide a more accurate representation of innovation in small firms.

Across all four analytical contexts (Figures 9–12), a consistent pattern emerges. Product and process innovation dominate measurement practices across both small and large firms, reflecting their compatibility with standardized frameworks. However, formal indicators such as patents and R&D expenditure are disproportionately applied to large firms, particularly in non-Indian contexts. In contrast, informal and context-specific measures especially frugal innovation remain underrepresented despite their empirical significance. This imbalance

highlights the need to rethink how innovation is conceptualized and measured in small-firm research.

4. CONCLUSION

Taken together, the findings reveal a fundamental misalignment between how innovation is measured and how it is practiced in small firms. The continued dominance of product and process indicators, alongside formal proxies such as patents and R&D expenditure, reflects a narrow and formalized understanding of innovation that privileges large, resource-rich firms. As a result, the innovation activities of small firms particularly those operating in resource-constrained and informal environments remain underrepresented and often invisible within existing measurement frameworks.

This review shows that innovation in small firms is not absent but differently constituted. It is typically incremental, adaptive, and embedded in frugal or informal practices that fall outside conventional metrics. The limited incorporation of these practices into empirical measures represents not only a methodological gap but also a conceptual limitation in the literature. Consequently, prevailing approaches risk producing biased conclusions and misinforming policy by overlooking the forms of innovation that sustain small-firm competitiveness.

Addressing this gap requires a shift toward more inclusive and context-sensitive measurement frameworks. Future research must move beyond standardized indicators and develop tools capable of capturing the diversity, intensity, and purpose of innovation across firm types and institutional contexts. Without such a shift, both academic research and policy interventions will continue to underestimate the innovative capacity of small firms.

Importantly, the issue is not merely empirical but conceptual. Dominant innovation frameworks are rooted in formal, often Western-centric models that fail to capture context-specific and resource-constrained practices. As a result, small firms

are not only under-measured but also theoretically underrepresented in the innovation literature.

Theoretical Implications

This study makes three key contributions to the literature on innovation and small firms.

First, it extends the resource-based view by showing that resource constraints can act as a catalyst for alternative forms of innovation rather than simply a limitation. The prevalence of incremental and frugal innovation suggests that innovation pathways are contingent on resource availability and may differ fundamentally from those observed in large firms.

Second, the study contributes to institutional theory by demonstrating how measurement frameworks are shaped by formal institutional environments. The dominance of patents and R&D indicators reflects institutional norms that privilege codified knowledge, thereby marginalizing informal and context-specific innovation practices.

Third, the study advances the literature on innovation measurement by identifying a disconnect between the conceptual recognition of frugal innovation and its empirical operationalization. By highlighting its underrepresentation, the study calls for a broader reconceptualization of innovation that is more inclusive of diverse contexts and firm types.

By integrating insights from the resource-based view and institutional theory, this study moves the literature beyond universal models of innovation toward more differentiated and context-sensitive frameworks.

Policy Implications

The findings have important implications for policymakers seeking to promote innovation in small firms. Existing policy frameworks often rely on formal indicators such as patents and R&D expenditure to assess innovation performance and allocate support. As this review demonstrates, such measures systematically

exclude a substantial share of innovative activity, particularly in emerging economies.

There is a need to design more inclusive policy instruments that recognize and support informal, incremental, and frugal innovation. This may involve developing alternative metrics, promoting grassroots innovation networks, and strengthening systems that facilitate knowledge sharing and capability development among small firms.

At the same time, reducing barriers to formal innovation systems such as simplifying patent procedures and improving access to finance can help bridge the gap between informal and formal innovation. However, policy should aim to complement rather than replace informal innovation practices.

Without revising existing measurement frameworks, policy

interventions risk reinforcing existing biases by disproportionately supporting firms that conform to formal innovation models, thereby excluding a large segment of innovative small firms.

Limitations

This study has several limitations. First, it includes only English-language publications, potentially excluding relevant research in other languages. Second, although Scopus and Google Scholar provide broad coverage, some region-specific or unpublished studies may not have been captured. Third, as a systematic literature review, the study synthesizes existing evidence but does not establish causal relationships. These limitations point to the need for complementary empirical research.

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