

Lean Management in SME Entrepreneurship: Mechanisms, Challenges, and Pathway Innovations

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Abstract: As a management paradigm centered on value creation and continuous optimization, lean management offers small and medium-sized enterprises (SMEs) an efficient pathway during the entrepreneurial stage. Building on the characteristic constraints of early-stage SMEs—limited resources, capability gaps, and environmental uncertainty—this article systematically analyzes the mechanisms through which lean management operates, probes the resource, capability, cultural, and collaboration challenges encountered in practice, and proposes pathway-innovation strategies. The study finds that lean management, through value-stream optimization, rapid trial-and-error, talent-centric practices, and process collaboration, helps SMEs build entrepreneurial models characterized by dynamic adaptation and resource efficiency. This research extends the theoretical boundary of lean management within the field of entrepreneurial management and provides actionable guidance for SME entrepreneurship in China.

Keywords: Lean Management; Small and Medium-Sized Enterprises; Entrepreneurial Management; Pathway Innovation

1. Introduction

With ongoing economic globalization and technological innovation, SMEs—an important force for job creation and innovation—face complex and volatile economic conditions at the entrepreneurial stage. In fiercely competitive markets, traditional management paradigms struggle to resolve operational predicaments and meet the evolving needs of SME development. Improving productivity, reducing resource waste, and enhancing competitiveness are thus pivotal challenges for SMEs at start-up.

Lean management originated in the Toyota Production System (TPS) [1]. Centered on

customer demand, it eliminates waste, optimizes processes, and pursues value maximization—constituting a comprehensive management system. In China, lean-informed practices such as FAW's HPS and CIMC's ONE model have delivered notable economic and managerial value. As primary carriers of technological innovation and productivity, SMEs are vibrant in their entrepreneurial stage yet constrained by resources, managerial capacity, and market position. Under the dual influences of entrepreneurial uncertainty and industrial complexity, the application of lean management in SMEs presents both opportunities and challenges. This paper systematically explores the mechanisms of lean management in SME entrepreneurship, examines the major implementation challenges, and proposes targeted pathway-innovation strategies.

2. The Evolution of Lean Management

Lean management traces its roots to early scientific management and mass production. To overcome the rigidity and waste of mass production, the Toyota Production System (TPS) institutionalized flow, Just-in-Time (JIT). Krafcik later labeled this approach “lean,” and Womack and Jones reframed it as a systemic management philosophy rather than a toolkit—centered on customer-defined value, value-stream mapping, flow and pull, and continuous improvement [1].

Since the 2000s, lean has diffused beyond manufacturing into lean service operations, lean supply chain management, and lean product development (LPD) [2]. LPD emphasizes an integrated process—tools—people perspective and capability building [3]. In parallel, Lean Startup and Customer Development operationalize lean's customer-value logic via the Build–Measure–Learn loop and the minimum viable product (MVP) to accelerate validated learning toward product–market fit (PMF) [4,5,6].

3. Mechanisms of Lean Management in SME Entrepreneurship

3.1 Value Focus: Enhancing Resource Allocation via Customer Needs and Value-Stream Identification

The core of lean is defining product value according to customer needs and avoiding wasteful activities. Early-stage SMEs can focus strategy and conserve scarce resources by narrowing to value-creating offerings. Value-stream mapping (VSM) tracks the end-to-end flow from raw materials to delivery, distinguishing value-adding, necessary but non-value-adding, and wasteful activities. By using VSM, SMEs can concentrate limited resources on key value nodes and maximize utilization. This value-oriented stance curbs blind expansion and redundancy and establishes an efficiency foundation in competitive markets.

3.2 Rapid Trial-and-Error: Low-Cost Innovation Driven by MVP

A central challenge for entrepreneurial SMEs is whether new products or services meet market requirements. Lean leverages the MVP mechanism and the “build–measure–learn” iteration to validate product–market fit. Compared with high-cost innovation efforts, this approach supports incremental innovation and, through co-creation with target customers, enhances product adaptability and evolutionary potential.

3.3 Talent-Driven: A Genuine Focus on People

Early lean explorations in the 1980s often pursued JIT and other tools in ways that risked “seeing things but not people.” Since the 2000s, emergent theories such as lean startup and lean product development have increasingly embodied people-centric management and the correct identification of organizational roles. Lean’s elegant system design is not about exhausting employees or indiscriminate headcount cuts; rather, it is about cultivating core employees who share the firm’s fate, tapping the intelligence and creativity of all staff, inspiring their best performance, and designing appropriate organizational structures [7].

3.4 Process Collaboration: Building Agility-Oriented Organizational Coordination

Lean transcends optimization of single business units and stresses end-to-end process reengineering and cross-functional governance. Start-up SMEs often suffer “information silos” due to loose structures and siloed responsibilities, which limit resource integration and decision efficiency. Value-oriented process integration and cross-department collaboration break functional barriers and enable efficient resource convergence and responsive decision-making. In volatile markets, lean’s real-time response mechanisms shorten reaction time and enhance strategic flexibility and market adaptability [8,9].

4. Challenges in Applying Lean Management to SME Entrepreneurship

4.1 Lean Adoption under Resource Constraints

Establishing a continuous-improvement system via process mapping, value-stream analysis, and standardized work demands significant investment in people, time, and information technology. Start-up SMEs often face capital and staffing shortages, inviting “symbolic adoption” or “partial implementation” lean implementation. Some firms reduce lean to mere cost cutting or downsizing, deviating from its customer-value essence. Such “symbolic lean adoption” not only fails to deliver expected results but may also increase managerial burdens and erode organizational trust in and commitment to lean [10].

4.2 Structural Deficits in Systems Management Capabilities

Lean requires capabilities in process governance, data-driven problem solving, and feedback-driven organizational learning. Early-stage SMEs often adopt flat, relationship-oriented structures; while employees may possess technical or market strengths, they frequently lack systematic management thinking and process experience. As a result, core lean mechanisms—such as the build–measure–learn loop, root-cause analysis, and KPI-based control—are difficult to implement. Ambiguous performance targets, unclear roles and responsibilities, and low coordination efficiency further impede lean’s potential for resource conservation and efficiency gains.

4.3 Cultural Tensions and Cognitive Misalignment

Lean's advocacy of standardization, data discipline, and rigor can create cultural tension with the flexibility, individual heroics, and fast decision-making prevalent in start-ups. Given organizational instability and fluid job roles, employees may lack the willingness or capability to uphold standardized processes. Founders' cognition and attitude toward lean are also decisive: if founders treat lean merely as experiential judgment or a contingency tool, standardization may become perfunctory. Moreover, lean depends on open feedback and continuous improvement, inadequate psychological safety within SMEs can suppress issue surfacing and participation, undermining the embedding of lean culture [11].

4.4 Weak Foundations for External Collaboration

End-to-end value-chain optimization in lean presupposes collaboration across upstream and downstream partners. SMEs often occupy downstream positions with limited bargaining power and technological voice, making it difficult to induce suppliers or channels to cooperate in process change. Information silos and limited collaborative intent within supply chains hinder the implementation of pull systems and just-in-time (JIT), blunting the systemic effects of internal optimization. In addition, external uncertainty—policy shifts and volatile demand—limits stable collaboration, constraining the external extension of lean and forcing reactive responses.

5. Pathway Innovations for Lean Management in SME Entrepreneurship

5.1 Deploy and Diffuse Lean Culture via Policy Deployment

Lean is not a mere collection of processes and tools but a value-oriented philosophy of continuous improvement. Promoting lean within SMEs requires a culture rooted at the top and transmitted to the front line through policy deployment. Two layers are central. First, an entrepreneurial layer: entrepreneurs integrate the end-to-end journey from concept to commercialization—linking design, development, production, and go-to-market—and lead by example to shape a highly collaborative work climate. Second, an engineering layer: a rational, technology-driven culture embeds continuous improvement, waste elimination, and customer-

defined value into daily innovation and product design, enabling faster, higher-quality, and lower-cost delivery. This Hoshin-driven cultural formation lays the cognitive foundation for deep lean embedding.

5.2 Leverage China's Complete Supply-Chain System as Fertile Ground for Lean

Lean's value lies not only in internal process optimization but also in end-to-end value-stream integration through industrial collaboration. Although SMEs at the chain's end struggle to mobilize partners, China's mature supply-chain system offers unique advantages. With an increasingly sophisticated manufacturing base and regional coordination, the country has built a responsive, multilayered network. SMEs can use lightweight information platforms, industrial alliances, or joint projects to address lack of supply-chain visibility and dynamically align production planning with market demand. Through industrial parks, supply-chain finance, and third-party platforms supported by local governments, SMEs can implement Just-in-Time (JIT) production, inventory optimization, and cost-management mechanisms—maximizing supply-chain efficiency and supporting lean's external extension.

5.3 Uphold a Genuine Respect-for-People Approach to Lean

Cross-organizational collaboration is a core element of lean, emphasizing Respect for People (RFP) and people development, with talent as the driving force of continuous improvement and organizational evolution. While top-management sponsorship is crucial, the caliber and execution of middle managers are the keystone of lean implementation. Middle managers serve as technical anchors and integrators who translate strategy into modules and solutions and enable knowledge flow and problem solving. SMEs should also cultivate and integrate core frontline talent to form a stable yet dynamic execution cohort, fostering shared fate and ownership. For example, nurturing self-organizing teams can strengthen belonging and accountability, activate proactive thinking, and catalyze collaborative improvement—creating a durable grassroots foundation for lean.

5.4 Integrate Agility to Build a Globally Competitive Product-Development System

New product development is the core arena for

SMEs' global competition, transforming market needs and technological possibilities into productivity and serving as the locus of technological innovation. Lean pursues waste minimization and flow efficiency, whereas agile emphasizes rapid iteration and time-to-market acceleration. By combining both, firms can achieve more efficient, faster, and more economical development. High-performing companies integrate tools, ways of working, and organizational elements into customized lean-agile solutions tailored to their needs, thereby meeting requirements more comprehensively and swiftly than before. Realizing this integration across structure, people, and processes entails organizational ambidexterity and warrants continued research and discussion.

6. Conclusion

Aimed at value creation and realized through continuous improvement and process optimization, lean management provides an efficient management model for SME entrepreneurship. Through four mechanisms—value focus, rapid trial-and-error, talent-driven practices, and process collaboration—lean helps SMEs innovate efficiently and adapt dynamically despite resource constraints and uncertainty. Yet its promotion is constrained by resource shortages, deficits in management capability, cultural tensions, and weak external collaboration. Accordingly, this paper proposes four pathway-innovation strategies to address start-up challenges and catalyze the shift from lean as a concept to lean as behavior. The study not only extends the theoretical framework of lean within entrepreneurial management but also offers practical guidance for SMEs to build adaptive and sustainable management models.

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