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Bridging the Scale-Up Gap: An Operational Readiness Maturity Model for High-Growth Enterprise Transformation

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Abstract
The persistent difficulty that innovative firms face in converting early promise into durable, globally competitive scale is commonly described as the scale-up gap. Prevailing explanations emphasize capital formation, talent availability, infrastructure, and public policy. This paper advances a complementary and comparatively underexplored explanation: many firms possess viable technologies and market opportunities yet lack the operational capabilities and implementation systems required to translate innovation into sustained economic value. Drawing on the resource-based view, dynamic capabilities theory, absorptive capacity, and the maturity-model tradition in information systems and operations management, the paper develops the Operational Scale-Up Readiness (OSR) framework and an associated maturity model. The model decomposes operational readiness to scale into seven capability domains: strategic and operating-model coherence, process architecture and standardization, data and digital infrastructure, technology adoption and integration capacity, supply and value-network integration, workforce and change capability, and performance-management and learning systems. Each domain is articulated across five progression levels from ad hoc to optimizing, yielding a diagnostic instrument that firms, investors, accelerators, and economic-development organizations can apply to locate readiness gaps and sequence capability investments. The paper specifies the theoretical logic linking each domain to scaling outcomes through a set of testable propositions, illustrates application through hypothetical firm scenarios, and situates the framework within regional innovation-ecosystem policy. The contribution is a transferable, evidence-informed diagnostic that reframes the scale-up challenge as a problem of operational execution and offers a structured pathway for building the capabilities that scaling requires. Implications for management practice, ecosystem intermediaries, and innovation policy are discussed, along with a research agenda for empirical validation.

Keywords: *scale-up gap; operational readiness; maturity model; dynamic capabilities; high-growth firms; innovation ecosystems; technology adoption; organizational scaling*

1. Introduction

The United States generates new technologies, ventures, and scientific discoveries at a rate few economies can match, yet a recurring structural problem constrains the translation of that inventive capacity into durable economic advantage. A substantial share of promising firms and technologies never make the transition from early-stage viability into stable, globally competitive enterprises. This transition problem, widely termed the scale-up gap, has drawn sustained attention from scholars of entrepreneurship and regional development because high-growth firms account for a disproportionate share of net job creation and productivity growth (Coad et al., 2014; Delmar et al., 2003; Henrekson & Johansson, 2010). When such firms fail to scale, the economic loss extends well beyond the individual venture to encompass forgone employment, weakened supply chains, and diminished regional competitiveness. Explanations of the scale-up gap have concentrated on a familiar set of external and resource-based constraints. Insufficient growth capital, thin managerial talent markets, inadequate infrastructure, and uneven public policy are all well documented (Brown & Mawson, 2016; Brown et al., 2017). These factors are real and consequential. They are not, however, a complete account. A firm may possess capital, a defensible technology, and a receptive market and still fail to scale because it cannot reliably execute at increasing volume, complexity, and geographic reach. The capacity to do so is fundamentally operational: it resides in processes, systems, data infrastructure, integration mechanisms, workforce capability, and management routines. This operational dimension of scaling has received comparatively little structured attention relative to its importance.

This paper addresses that gap by developing a framework and maturity model for what it terms operational scale-up readiness. The central claim is that scaling is not simply a function of resources acquired but of capabilities built, and that the capabilities most directly implicated in scaling are those that govern operational execution. A firm that grows faster than its operating system can absorb encounters quality failures, cost escalation, service breakdown, and organizational strain that can arrest or reverse growth. Understanding scaling therefore requires a way to assess, at a given point in time, whether a firm has the operational foundations to absorb and sustain growth, and where the binding constraints lie. The paper makes three contributions. First, it synthesizes several established theoretical traditions, the resource-based view, dynamic capabilities, absorptive capacity, and organizational readiness, into a coherent account of why operational capability governs scaling outcomes. Second, it translates that account into an actionable maturity model, the Operational Scale-Up Readiness model, that decomposes readiness into seven capability domains, each articulated across five progression levels. Third, it derives a diagnostic instrument and a set of testable propositions that render the framework usable by practitioners and researchable by scholars. Because the resulting tool is generic rather than firm-specific, it constitutes public knowledge that firms, investors, accelerators, and economic-development organizations across many sectors and regions can adopt. The framework is developed using a design-science logic, in which the objective is to construct and justify a useful artifact rather than to test a pre-existing hypothesis (Hevner et al., 2004; Peffers et al., 2007). The artifact, the maturity model and its diagnostic, is grounded in prior theory and existing maturity-model design principles, and its evaluation is specified as an agenda for subsequent empirical work. The remainder of the paper proceeds as follows. The next section reviews the relevant literature. Subsequent sections present the research approach, articulate the conceptual foundations of operational scale-up readiness, specify the seven capability domains and five maturity levels, describe the diagnostic instrument, advance the propositions, illustrate application, and discuss implications for practice and policy before concluding.

2. Background and Theoretical Foundations

2.1 The Scale-Up Gap and High-Growth Firms

High-growth firms occupy a central place in contemporary understandings of economic dynamism. A consistent empirical finding across national contexts is that a small proportion of firms accounts for the majority of net new jobs and a substantial share of aggregate productivity gains (Coad et al., 2014; Delmar et al., 2003; Henrekson & Johansson, 2010). These firms are heterogeneous in sector, age, and origin, which complicates policy targeting, but their collective economic weight is not in dispute. The scale-up gap refers to the shortfall between the number of firms that achieve early viability and the smaller number that progress to sustained, high-growth trajectories. Research on firm growth has long recognized that growth is neither automatic nor linear. Penrose (1959) framed the firm as a bundle of productive resources whose growth is governed by the managerial capacity to deploy and coordinate those resources, and argued that growth generates internal administrative constraints that limit the feasible rate of expansion. This insight, sometimes described as the Penrose effect, anticipates the modern observation that firms can grow faster than their internal systems can absorb. Gibrat (1931) proposed that firm growth is essentially random with respect to size, but subsequent empirical work has qualified this proposition and emphasized systematic determinants including capability and industry conditions (Coad, 2009). Policy scholarship on high-growth firms cautions against simplistic interventions. Brown and Mawson (2016) and Brown et al. (2017) document how narrowly targeted support can produce unintended consequences and argue that growth is episodic, unpredictable, and difficult to engineer through subsidy alone. Their work implies that effective support should build durable firm capabilities rather than provide one-time resource injections. This orientation aligns with the present paper: if the binding constraint on scaling is often operational capability, then interventions that strengthen operational readiness may be more durable than those that address resource gaps alone. A parallel literature situates the scale-up problem in its regional context. Innovation-driven growth is unevenly distributed, and regions differ markedly in their capacity to convert local invention into scaled enterprise (Audretsch & Feldman, 1996; Feldman, 2001). Applied work on localized supply-chain and logistics capacity likewise ties regional operational infrastructure to economic revitalization and resilience (Anene & Clement, 2024). The entrepreneurial-ecosystem perspective analyzes the configuration of local actors, institutions, and resources that support venture creation and growth (Autio et al., 2018; Isenberg, 2010; Spigel, 2017; Stam, 2015). While ecosystem research has clarified the environmental conditions for scaling, it has focused less on the internal operational capabilities that firms must possess to exploit those conditions. The framework developed here is intended to complement ecosystem analysis by specifying the firm-level operational readiness that ecosystem support is ultimately meant to enable.

2.2 Theoretical Foundations of Operational Capability

The proposition that operational capability governs scaling rests on four interlocking theoretical traditions. The resource-based view establishes that heterogeneous, valuable, rare, and difficult-to-imitate resources underpin sustained advantage (Barney, 1991; Peteraf, 1993; Wernerfelt, 1984). Operational capabilities, embedded in routines, systems, and tacit organizational knowledge, satisfy these criteria more readily than tradable resources such as capital or generic technology, which are more easily acquired by rivals (Grant, 1996; Spender, 1996). The resource-based view thus predicts that firms distinguished by superior operational capability will scale more successfully than firms that possess comparable technologies but weaker execution systems.

Dynamic capabilities theory extends the resource-based view to conditions of change and growth. Teece et al. (1997) defined dynamic capabilities as the firm capacity to integrate, build, and reconfigure internal and external competences to address rapidly changing environments, and Teece (2007) later specified their microfoundations as capacities to sense opportunities, seize them through resource commitment, and transform the organization to maintain fit. Eisenhardt and Martin (2000) characterized dynamic capabilities as identifiable organizational processes, such as product development, alliance formation, and resource allocation, that can be more or less effective. Scaling is a paradigmatic case requiring dynamic capabilities, because it demands continual reconfiguration of processes, structures, and resource commitments as volume and complexity rise (Helfat et al., 2007; Winter, 2003; Zollo & Winter, 2002). A firm with strong dynamic capabilities can reconfigure its operating system to absorb growth; a firm without them experiences growth as disruption. Absorptive capacity theory addresses the firm capacity to recognize, assimilate, and apply new external knowledge (Cohen & Levinthal, 1990; Zahra & George, 2002). Scaling frequently entails adopting new technologies, methods, and practices, and the capacity to absorb and operationalize these inputs depends on prior related knowledge and on the internal mechanisms that convert acquired knowledge into productive use. Absorptive capacity therefore links directly to the technology-adoption and learning dimensions of operational readiness developed below. Firms that have invested in the antecedents of absorptive capacity can implement new operational technologies more quickly and with fewer disruptions than firms that have not. Finally, the organizational-readiness and change literatures explain why capability alone is insufficient without collective commitment and change capacity. Weiner (2009) theorized organizational readiness as a shared psychological state combining change commitment and change efficacy, and argued that readiness predicts the effectiveness of implementation. Armenakis et al. (1993) and Kotter (1995) similarly emphasized that transformation efforts fail when the organization is not prepared to enact and sustain change. Because scaling is a continuous transformation rather than a discrete event, readiness in this sense is a recurring requirement. The framework developed here incorporates change capability as one of its capability domains for precisely this reason. Taken together, these traditions converge on a single implication: the ability to scale is a capability that is built through investment in processes, systems, knowledge, and organizational routines, and it is distinct from the resources that a firm acquires. This implication motivates a structured means of assessing where a firm stands in building that capability, which is the function of a maturity model.

2.3 Maturity Models as a Design Tradition

Maturity models describe an anticipated, desired, or typical evolution of an object through a sequence of discrete stages, and they are widely used to assess an organization's current state and to guide improvement (Becker et al., 2009; De Bruin et al., 2005). The tradition originates in software-process improvement, most influentially the Capability Maturity Model, which articulated five levels from initial to optimizing and became a template for maturity thinking across many domains (Paulk et al., 1993). Subsequent scholarship has established design principles for rigorous maturity models, distinguishing descriptive models that assess current state, prescriptive models that indicate improvement paths, and comparative models that enable benchmarking (Mettler, 2011; Poppelbuss & Roglinger, 2011).

Methodological guidance for maturity-model development emphasizes grounding the model in theory and existing knowledge, specifying the dimensions and levels clearly, and defining a procedure for assessment (Becker et al., 2009; De Bruin et al., 2005). The design-science paradigm provides the overarching methodology: a maturity model is an artifact whose value derives from its usefulness in a class of problems and whose construction should be justified by reference to a rigorous knowledge base and evaluated against defined criteria (Hevner et al., 2004; Peffers et al., 2007). Maturity models have proliferated in adjacent fields, including business-process management, digital transformation, and supply-chain management, demonstrating the portability of the approach to operational domains (Roglinger et al., 2012). The present paper applies these principles to the specific and, to date, underserved problem of operational readiness to scale.

A recurring critique of maturity models is that they can imply a deterministic, one-size-fits-all progression that understates contingency and context (Poppelbuss & Roglinger, 2011). The framework developed here responds to this critique in two ways. It treats the maturity levels as descriptions of capability sophistication rather than as a mandatory sequence every firm must follow identically, and it explicitly identifies contextual moderators that shape which domains are most binding for a given firm. The objective is a model that is structured enough to be diagnostic and flexible enough to accommodate heterogeneity among scaling firms.

3. Research Approach

The framework is developed through design-science research, which is oriented toward the construction and justification of a useful artifact addressing a defined class of problems (Hevner et al., 2004; Peffers et al., 2007). The problem class is the assessment and development of operational readiness to scale among high-growth-oriented firms. The artifact is a maturity model comprising seven capability domains, five progression levels, and a diagnostic instrument, accompanied by a theoretical rationale expressed as propositions.

Construction of the model followed the phased logic recommended for maturity-model development (Becker et al., 2009; De Bruin et al., 2005). The scope and problem were defined through the scale-up literature; the design was grounded in the theoretical foundations reviewed above and in established maturity-model design principles; the capability domains were derived by mapping the operational determinants of scaling identified across operations strategy, information systems, supply-chain, and organizational-change research onto a parsimonious set of orthogonal dimensions; and the level descriptors were specified by adapting the generic maturity progression from ad hoc to optimizing to the content of each domain. The model is presented here as a descriptive and prescriptive artifact whose comparative and predictive validity is to be established through the empirical program specified in the discussion. Consistent with design-science practice, the paper distinguishes clearly between the theoretical justification offered here and the empirical evaluation reserved for future work.

4. The Operational Scale-Up Readiness Framework

4.1 Conceptualizing Operational Scale-Up Readiness

Operational scale-up readiness is defined here as the degree to which a firm operating system, comprising its processes, information and data infrastructure, integration mechanisms, workforce capability, and management routines, can absorb and sustain substantial increases in volume, complexity, and geographic or market reach without disproportionate loss of quality, cost control, or service reliability. The construct is deliberately operational rather than strategic or financial. It concerns execution capacity, not the attractiveness of the opportunity or the availability of capital, although it interacts with both. The construct rests on three premises. First, scaling imposes rising operational load, because volume, product variety, customer diversity, and geographic spread each increase the coordination and information-processing demands placed on the operating system (Galbraith, 1974). Second, the operating system has a finite absorptive capacity that is determined by its design and its underlying capabilities, echoing the Penrosean observation that internal administrative capacity bounds the feasible growth rate (Penrose, 1959). Third, readiness is multidimensional and only as strong as its binding constraint, because a deficiency in any critical operational domain can arrest growth even when other domains are advanced. These premises jointly imply that readiness should be assessed across multiple orthogonal domains and that the diagnostic value of an assessment lies substantially in identifying the least mature, most binding domain. Operational scale-up readiness is distinct from, but related to, several adjacent constructs. It is distinct from operational performance, which measures current output quality, cost, and reliability at present scale; a firm can perform well at its current size yet lack the readiness to sustain that performance at a larger size. It is distinct from technological readiness, which concerns the maturity of a specific technology rather than the firm capacity to operationalize technologies generally. And it is distinct from financial readiness, which concerns capital adequacy. Readiness in the present sense is the capability substrate that determines whether resources, once acquired, can be converted into scaled operational output. This positioning clarifies why firms with capital and technology still fail to scale: the missing element is frequently the operational capability substrate that the maturity model is designed to assess.

4.2 Capability Domains

Figure 1 presents the operational scale-up readiness framework, in which the seven capability domains combine into operational readiness that in turn conditions scaling outcomes.

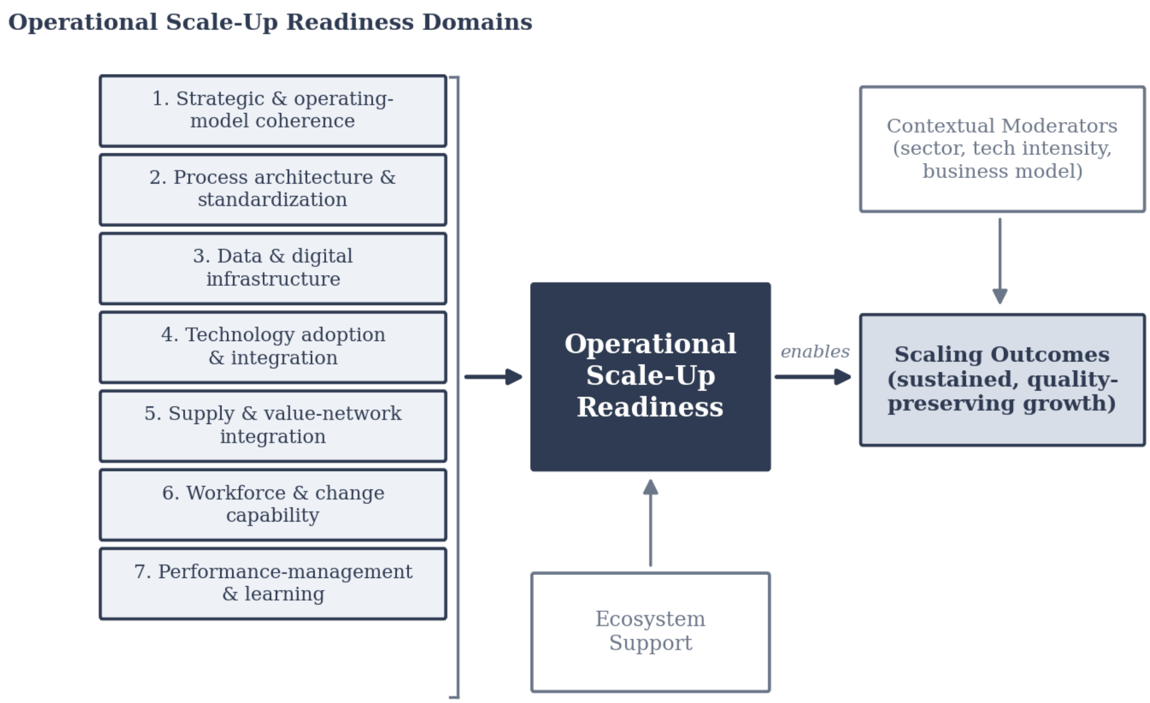

Figure 1. The operational scale-up readiness framework: seven capability domains combine into operational readiness, which conditions scaling outcomes, subject to contextual moderators and ecosystem support.

The model decomposes operational scale-up readiness into seven capability domains. The domains were selected to be collectively comprehensive of the operational determinants of scaling and mutually distinct, so that an assessment across them locates readiness gaps precisely. Each domain is summarized below together with its theoretical grounding and its mechanism of influence on scaling.

Domain 1: Strategic and operating-model coherence. This domain concerns the alignment between the firm growth strategy and the design of its operating model, including its choices about what to standardize, what to differentiate, what to insource or outsource, and how to configure its value chain. Operations-strategy research establishes that sustained performance depends on coherent, mutually reinforcing operational choices aligned to competitive priorities (Hayes & Wheelwright, 1984; Skinner, 1969; Slack & Lewis, 2011). Firms that scale without an explicit, coherent operating model tend to accumulate ad hoc arrangements that become sources of cost and fragility as volume rises. Maturity in this domain manifests as an articulated operating model that is deliberately designed for the intended scale and periodically reassessed.

Domain 2: Process architecture and standardization. This domain concerns the extent to which core value-creating and supporting processes are defined, documented, standardized where appropriate, and continuously improved. Process management is foundational to scaling because unstandardized processes do not replicate reliably as volume and headcount grow (Davenport, 1993; Hammer & Champy, 1993). Standardization is not uniform standardization of everything; mature firms standardize where consistency creates value and preserve flexibility where differentiation does. Maturity manifests as an explicit process architecture with defined ownership, documented standard work, and mechanisms for improvement. Applied operations studies show that formalizing and automating core procurement and workflow processes improves efficiency and transparency as transaction volumes rise (Akinleye & Adeyoyin, 2021). Related work treats standardized operating procedures and lean process-improvement methods as scalable assets that make execution repeatable as small and growing organizations expand (Ambali et al., 2021; Eyetsemitan et al., 2022).

Domain 3: Data and digital infrastructure. This domain concerns the quality, integration, and accessibility of the data and digital systems on which coordinated operation at scale depends. Information-systems research links integrated IT infrastructure and information capability to organizational performance and agility (Bharadwaj, 2000; Ross et al., 1996; Sambamurthy et al., 2003). As firms scale, fragmented systems and poor data quality generate coordination failures, impede automation, and obscure the visibility that management requires. Maturity manifests as integrated systems, governed and trustworthy data, and infrastructure that can extend to new volumes and locations without wholesale rebuilding. Applied operations research similarly connects data-driven management systems, business intelligence, and analytical visualization to measurable performance improvement, and links executive decision systems to the data foundations that make them reliable (Akinleye et al., 2023; Babatope et al., 2023; Efobi et al., 2021; Lawal & Oduleye, 2019). Further applied studies tie risk-based business-intelligence architecture and data-driven process optimization to the visibility and bottleneck identification that scaling operations require (Eyetsemitan et al., 2024; Mbonu et al., 2021).

Domain 4: Technology adoption and integration capacity. This domain concerns the firm capacity to adopt, integrate, and operationalize new technologies as scaling requires, including automation, analytics, and emerging tools. It draws directly on absorptive capacity (Cohen & Levinthal, 1990; Zahra & George, 2002) and on research on the assimilation of technological innovations within organizations (Attewell, 1992; Fichman, 2004). Scaling firms repeatedly confront the need to adopt new operational technologies, and the capacity to do so quickly and with limited disruption is itself a capability that varies across firms. Maturity manifests as repeatable, low-disruption adoption supported by the prior knowledge, integration skills, and change routines that absorptive capacity requires. Applied studies of enterprise technology implementation reinforce this logic, showing that structured cloud-migration and platformintegration approaches, disciplined program and rollout management, and explicit governance and organizational-readiness mechanisms condition how smoothly firms operationalize new systems at scale (Badmus et al., 2025; Ladapo et al., 2022; Okoruwa et al., 2024; Oteri & Edivri, 2024). Applied frameworks for supply-chain digital transformation and for integrating IT systems engineering with operations further show that embedding new systems into the operating core, with attendant risk and compliance controls, is what distinguishes durable adoption from isolated deployment (Mbonu et al., 2020; Okonkwo et al., 2023).

Domain 5: Supply and value-network integration. This domain concerns the integration and coordination of the firm with its suppliers, partners, and channels, and the resilience of the resulting network. Supply-chain research establishes that integration across organizational boundaries improves performance and that networks vary in their resilience to disruption (Flynn et al., 2010; Frohlich & Westbrook, 2001; Lambert & Cooper, 2000). Scaling almost always intensifies dependence on external partners, and a firm that scales faster than its supply network can support encounters shortages, quality problems, and service failures. Maturity manifests as integrated planning with key partners, visibility across the network, and deliberate resilience arrangements. Applied supply-chain research develops these mechanisms in operational detail, linking structured supplier-relationship management and data-driven lean network optimization to efficiency, and connecting predictive, technology-enabled logistics design and formal resilience indices to networks that sustain performance under disruption and growth (Akinleye & Adeyoyin, 2022; Anene & Clement, 2022; Efobi et al., 2022; Efobi et al., 2023). Applied supply-chain frameworks reinforce each element, linking materials readiness, digital supply-chain governance, and formal resilience design to networks that sustain performance as operations scale across sites and partners (Ogunwole et al., 2021; Okonkwo et al., 2021; Okonkwo et al., 2024).

Domain 6: Workforce and change capability. This domain concerns the firm capacity to recruit, develop, organize, and lead a workforce through the transitions that scaling entails, and its collective capacity to enact change. It draws on organizational-readiness and change theory (Armenakis et al., 1993; Kotter, 1995; Weiner, 2009) and on the recognition that human and organizational factors are decisive in operational transformation. Scaling stresses roles, structures, culture, and leadership, and firms frequently stall because their people systems and change capacity lag their growth. Maturity manifests as workforce planning aligned to the growth path, structured capability development, and a demonstrated capacity to lead change without recurrent disruption. Applied research on change management in digital transformation similarly finds that structured change-adoption methods reduce disruption as organizations restructure work during growth (Eyetsemitan et al., 2023).

Domain 7: Performance-management and learning systems. This domain concerns the systems through which the firm sets targets, measures performance, and learns and improves. Performance-measurement research emphasizes balanced, forward-looking measurement linked to strategy (Kaplan & Norton, 1992), and the dynamic-capabilities literature emphasizes deliberate learning as the engine of capability evolution (Nonaka, 1994; Zollo & Winter, 2002). Without robust measurement and learning, scaling firms lose the visibility and feedback needed to detect emerging operational strain and to reconfigure in response. Maturity manifests as integrated measurement aligned to strategy, disciplined review, and institutionalized learning that feeds continuous improvement. Applied performance-management research illustrates this domain through analytics-based performance-intelligence systems, KPI-driven decision and optimization frameworks, and service-assurance systems engineered to sustain reliability as user populations and transaction volumes expand (Adelanwa et al., 2023; Edivri & Oteri, 2024; Oteri & Edivri, 2026). Applied performance-management work likewise connects real-time KPI tracking and organizational-learning maturity models to the disciplined measurement and continuous improvement this domain describes (Arumosoye & Obriki, 2021; Tonoyan et al., 2024).

Table 1 summarizes the seven domains and the focus of each.

Table 1. The seven operational scale-up readiness domains.

Domain	Focus of the domain
1. Strategic and operating-model coherence	Alignment between growth strategy and operating-model design, including what to standardize, differentiate, insource, or outsource.
2. Process architecture and standardization	Definition, documentation, ownership, and continuous improvement of core value-creating and supporting processes.
3. Data and digital infrastructure	Quality, integration, and accessibility of the data and digital systems on which coordinated operation at scale depends.
4. Technology adoption and integration capacity	Capacity to select, implement, and absorb new operational technologies into the operating core.
5. Supply and value-network integration	Integration, visibility, and resilience of the supply and partner network under growth and disruption.
6. Workforce and change capability	Capacity to recruit, develop, organize, and lead the workforce through the transitions that scaling entails.
7. Performance-management and learning systems	Measurement, control, and organizational learning that sustain performance as scale and complexity increase.

4.3 Maturity Levels and Progression

Figure 2 shows the five-level maturity scale that is applied to each domain.

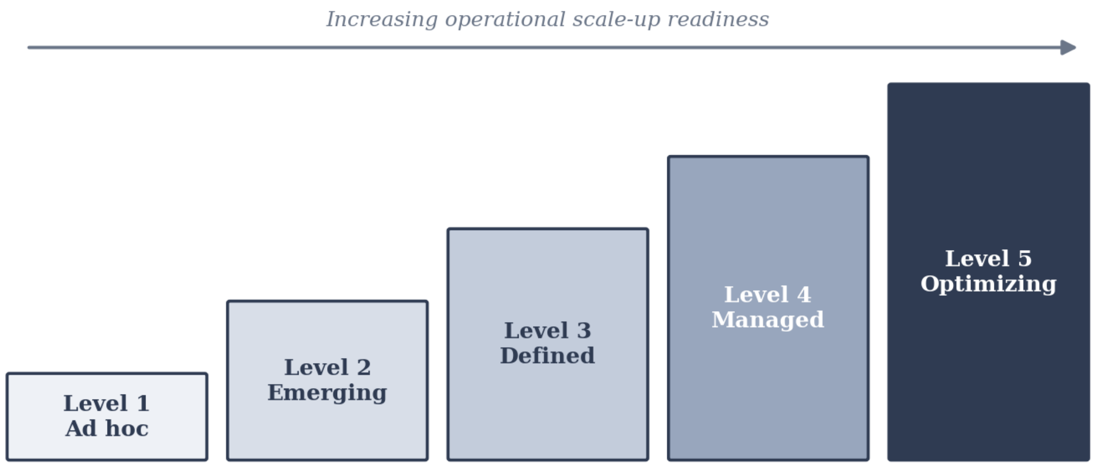

Figure 2. The five-level maturity scale applied to each readiness domain, from ad hoc practice to continuous optimization.

Each capability domain is assessed across five maturity levels, adapting the generic maturity progression established in the maturity-model tradition (Becker et al., 2009; Paulk et al., 1993). The levels describe increasing sophistication, institutionalization, and adaptive capacity within a domain. They are described generically here and instantiated per domain in the diagnostic instrument.

Level 1, Ad hoc. Practices in the domain are informal, undocumented, and dependent on individuals. Outcomes are inconsistent and difficult to reproduce as volume or headcount grows. The firm has little visibility into the domain and addresses problems reactively.

Level 2, Emerging. Some practices are defined and repeated within units, but they are inconsistent across the organization and are not yet governed. The firm has begun to recognize the domain as important but has not systematized it.

Level 3, Defined. Practices are documented, standardized where appropriate, and applied consistently across the organization, with defined ownership. The domain is governed and its performance is visible. The firm can replicate its practices reliably as it grows.

Level 4, Managed. Practices are quantitatively managed using data, with performance actively monitored against targets and controlled within predictable ranges. The firm anticipates operational strain and manages the domain proactively as scale increases.

Level 5, Optimizing. The domain is subject to continuous, data-driven improvement and deliberate reconfiguration in anticipation of changing conditions. Capability in the domain is a source of advantage and adapts ahead of need, reflecting mature dynamic capability (Teece, 2007; Winter, 2003). An assessment yields a maturity level for each of the seven domains, producing a readiness profile rather than a single score. The profile is more diagnostically useful than an aggregate because scaling is constrained by the least mature critical domain. A firm that is optimizing in six domains but ad hoc in supply-network integration is constrained by that single domain, and the profile makes the binding constraint visible so that capability investment can be sequenced accordingly. Where a single indicator is required, for benchmarking or portfolio comparison, a conservative aggregate that weights the minimum domain heavily is more faithful to the constraint logic than a simple average.

Table 2 defines the five maturity levels and their characteristics.

Table 2. The five maturity levels and their defining characteristics.

Level	Label	Characteristic
1	Ad hoc	Practices are informal, undocumented, and dependent on individuals; capability is not reliably repeatable.
2	Emerging	Some practices are documented and repeatable in parts of the organization but remain inconsistent across it.
3	Defined	Practices are standardized, documented, and applied consistently, with clear ownership.
4	Managed	Practices are measured and controlled, and performance is actively managed against defined metrics.
5	Optimizing	Practices are continuously improved through systematic learning and adaptation as the firm scales.

4.4 The Diagnostic Instrument

Figure 3 illustrates a readiness profile across the seven domains, in which the lowest-scoring critical domain is the binding constraint on scaling.

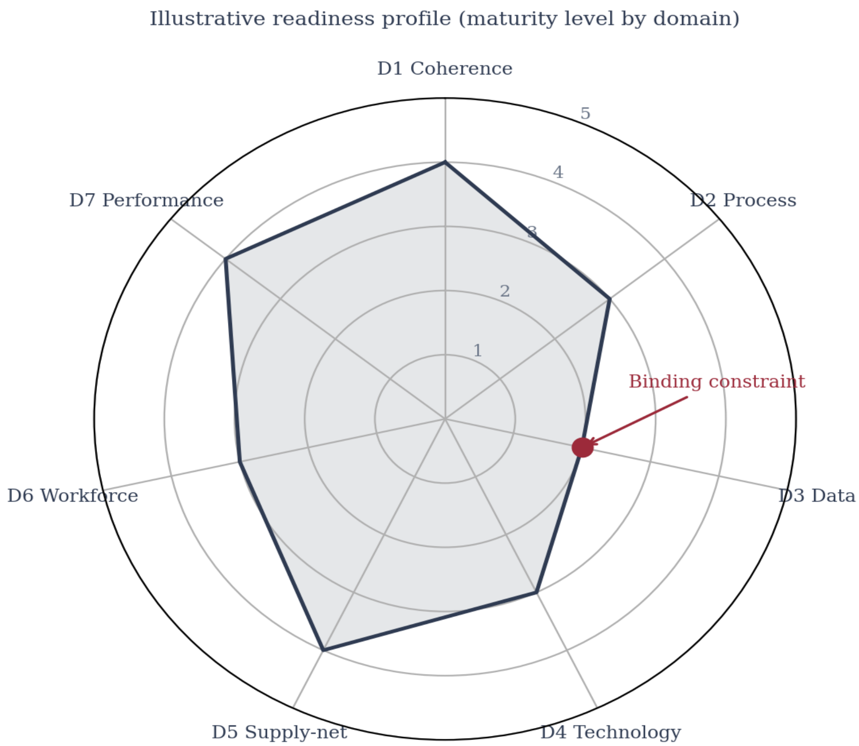

Figure 3. Illustrative readiness profile across the seven domains. The lowest-scoring critical domain (here, data and digital infrastructure) is the binding constraint on scaling.

The diagnostic instrument operationalizes the model for assessment. For each of the seven domains, the instrument specifies a set of observable indicators and behaviorally anchored descriptors corresponding to each maturity level, so that an assessor can locate the firm current level by matching observed practice to descriptors rather than by subjective rating. This behaviorally anchored design follows maturity-model methodology and improves inter-rater reliability relative to unanchored scales (De Bruin et al., 2005; Poppelbuss & Roglinger, 2011).

Assessment can be conducted through self-assessment, facilitated assessment, or independent evaluation, with increasing reliability and cost across those modes. For a firm seeking to guide its own capability development, structured self-assessment is sufficient to reveal the binding constraint. For an investor, accelerator, or economic-development organization comparing firms or tracking a portfolio, facilitated or independent assessment provides greater comparability. Evidence for each indicator is drawn from documentation, systems, and interviews, so that levels are assigned on observable practice rather than aspiration.

The output of an assessment is threefold: a readiness profile across the seven domains, an identification of the binding constraint and any secondary constraints, and a prescriptive improvement path indicating the practices required to advance the binding domain to the next level. Because the level descriptors are cumulative, the improvement path is well defined: advancing a domain requires instituting the practices specified at the next level while sustaining those already achieved. This prescriptive output distinguishes the instrument from a purely descriptive assessment and connects diagnosis to action.

5. Propositions and Contextual Moderators

5.1 Propositions

The theoretical logic of the framework is expressed as a set of propositions that specify the expected relationships between operational readiness and scaling outcomes. The propositions are stated to be testable in the empirical program described later.

Proposition 1. Firms with higher overall operational scale-up readiness achieve superior scaling outcomes, measured by sustained growth in revenue and employment with maintained quality, cost control, and service reliability, than firms with comparable technologies, market opportunities, and capital but lower readiness.

Proposition 2. The relationship between readiness and scaling outcomes is governed disproportionately by the least mature critical domain, such that the binding constraint predicts the point at which scaling strain emerges more strongly than the average readiness level.

Proposition 3. Absorptive capacity, reflected in the technology adoption and integration domain, moderates the speed and disruption cost with which scaling firms adopt new operational technologies, such that higher maturity in this domain is associated with faster and less disruptive adoption.

Proposition 4. Readiness in the data and digital infrastructure domain is a precondition for advancement in the technology adoption, supply-network integration, and performance-management domains, such that low infrastructure maturity constrains achievable maturity in those dependent domains.

Proposition 5. Workforce and change capability moderate the rate at which a firm can advance maturity in the other domains, because capability building in every domain requires the organization to enact and sustain change.

Proposition 6. The effect of external ecosystem support on scaling outcomes is mediated by firm operational readiness, such that support translates into scaling more effectively for firms with the operational capability to exploit it.

Proposition 7. The relative importance of the seven domains varies with firm context, including sector, technology intensity, and business model, such that the binding constraint distribution differs systematically across firm types.

Table 3 summarizes the seven propositions.

Table 3. Summary of the seven propositions.

#	Proposition (summary)
P1	Higher overall operational scale-up readiness predicts superior scaling outcomes, defined as sustained, quality-preserving growth.
P2	The least mature critical domain acts as the binding constraint that disproportionately governs scaling outcomes.
P3	Absorptive capacity, reflected in technology adoption and integration, moderates the speed and disruption cost of adopting new operational technologies.
P4	Readiness in data and digital infrastructure is a precondition for advancement in the technology, supply-network, and performance domains.
P5	Workforce and change capability moderates the rate at which a firm can advance maturity in the other domains.
P6	The effect of external ecosystem support on scaling outcomes is mediated by firm operational readiness.
P7	The relative importance of the seven domains varies with sector, technology intensity, and business model.

5.2 Contextual Moderators of Readiness Requirements

The maturity model describes a general structure of operational readiness, but the relative importance of its domains is contingent on firm context, and acknowledging this contingency addresses a standing critique of maturity models (Poppelbuss & Roglinger, 2011). Several moderators shape which domains are most binding for a given firm.

Sector and product architecture influence the salience of process standardization and supply-network integration. Firms producing physical goods with complex bills of materials depend heavily on supply-network integration and process standardization, whereas digital-service firms may find data and digital infrastructure and technology adoption more binding. The distinction between functional and innovative products, and the corresponding distinction between efficient and responsive supply configurations, further conditions where readiness investment yields the greatest return (Fisher, 1997). Technology intensity elevates the technology adoption and integration domain and its dependence on data and digital infrastructure. Firms whose scaling depends on continual adoption of automation and analytics require higher absorptive capacity and more capable infrastructure than firms whose operations are comparatively stable. Business-model characteristics, including the degree of asset intensity and the reliance on network partners, shift the weight among domains accordingly.

Growth rate and stage also moderate requirements. Very rapid growth compresses the time available to build capability and raises the premium on workforce and change capability and on performance-management systems that can detect strain early. Earlier-stage firms may rationally accept lower maturity in some domains while prioritizing the one or two domains most binding for their immediate growth, whereas later-stage firms scaling across geographies require broad maturity. These moderators do not alter the structure of the model; they inform how the readiness profile should be interpreted and how capability investment should be prioritized for a given firm.

6. Application and Implications

6.1 Illustrative Application Scenarios

Three hypothetical scenarios illustrate how the framework functions as a diagnostic and prescriptive tool. The scenarios are constructed to demonstrate application logic and do not report empirical cases.

Scenario A: A technology-intensive hardware venture. A venture with a validated advanced-hardware product and committed growth capital experiences escalating quality problems and missed delivery commitments as demand rises. A readiness assessment reveals optimizing maturity in strategy and defined maturity in process architecture, but ad hoc maturity in supply and value-network integration, which is the binding constraint. The prescriptive path directs the firm to institute integrated planning with key suppliers, establish network visibility, and build resilience arrangements before further increasing volume. The framework thereby redirects attention from the visible symptom, quality failures, to the underlying operational constraint.

Scenario B: A digital-services firm scaling across markets. A software-enabled services firm with strong demand finds that service quality degrades as it enters new markets. Assessment shows advanced maturity in workforce capability but emerging maturity in data and digital infrastructure, which constrains its performance-management and technology-adoption domains. Because infrastructure is a precondition domain, the prescriptive path prioritizes integrating systems and establishing data governance before further geographic expansion, resolving the constraint that limits the dependent domains.

Scenario C: An investor screening a growth portfolio. An economic-development organization or growth investor applies the diagnostic across a portfolio of firms to allocate capability-building support. Rather than treating all firms identically, the organization uses the readiness profiles to target support at each firm binding constraint, directing supply-chain assistance to one firm, data-infrastructure support to another, and change-leadership development to a third. The framework thereby converts a general support budget into constraint-targeted intervention, consistent with the policy argument that capability building outperforms undifferentiated resource provision (Brown & Mawson, 2016).

6.2 Implications for Practice and Policy

For firm leaders, the framework reframes scaling as a problem of building operational readiness rather than solely of acquiring resources. It provides a structured means to assess where a firm stands, to identify the binding constraint on its growth, and to sequence capability investment accordingly. The constraint logic is particularly consequential: because scaling is limited by the least mature critical domain, undifferentiated investment across all domains is inefficient relative to targeted investment in the binding constraint. Leaders can use the readiness profile to prioritize and to avoid the common failure mode of growing faster than the operating system can absorb.

For investors, accelerators, and other ecosystem intermediaries, the framework offers a comparable, evidence-oriented basis for due diligence and for portfolio support. Assessing operational readiness complements the assessment of market and technology that dominates current practice, and it identifies where post-investment support can most effectively strengthen a firm scaling capacity. This addresses a practical gap: intermediaries often provide capital and mentoring without a structured means to assess or build the operational capabilities that scaling requires. For policymakers and economic-development organizations, the framework speaks to the design of programs intended to strengthen regional innovation ecosystems. If firm-level operational readiness mediates the effect of ecosystem support on scaling outcomes, then programs that build operational capability, through diagnostics, capability-building services, and the diffusion of implementation methodologies, may produce more durable results than programs that provide resources alone (Brown & Mawson, 2016; Brown et al., 2017). Applied studies of digital procurement transformation and enterprise cloud migration similarly emphasize that diffusing concrete implementation methodologies builds durable operational capacity across organizations (Ladapo et al., 2025; Okoruwa et al., 2025). Applied frameworks for national-scale supply-chain optimization through integrated IT and procurement systems illustrate how such capability-building extends from the firm to the regional and national level (Okonkwo et al., 2025). The framework also provides a common language and metric that regional actors can share, enabling coordinated capability-building and cross-regional benchmarking. Because the diagnostic is generic and transferable, it can be adopted across sectors and regions and can inform the design of publicly supported implementation resources, extending its benefit beyond any single firm.

7. Extended Theoretical Discussion

7.1 Capability, Learning, and Organization Design

Operational capabilities are most precisely understood as organized bundles of routines through which a firm performs and improves its recurring activities, and it is this routinized character that makes them durable and difficult to imitate (Nelson & Winter, 1982; Peng et al., 2008; Wu et al., 2010). Routines encode accumulated learning and coordinate distributed knowledge, so a firm capacity to scale reflects the quality of the routines it has built rather than the resources it has purchased. Because routines are path dependent and accumulate gradually, they cannot be acquired instantaneously when growth accelerates, which is the deeper reason that operational readiness must be built in advance of the demand it is meant to absorb. The resource-based and dynamic-capability perspectives jointly explain why some firms convert opportunity into scaled advantage while others do not. Asset-stock accumulation, causal ambiguity, and the co-specialization of complementary assets make superior operating systems costly to replicate (Amit & Schoemaker, 1993; Dierickx & Cool, 1989; Makadok, 2001). Reviews of the dynamic-capability literature clarify that these capabilities operate through identifiable processes rather than as a tautological label, and that their value is contingent on the environment in which they are deployed (Ambrosini & Bowman, 2009; Barreto, 2010; Wang & Ahmed, 2007). This contingency is central to a scaling context, where the capabilities that matter most shift as the firm grows. Recent work locates the microfoundations of capability in managerial cognition and in the sensing, seizing, and reconfiguring processes that convert perception into organizational change (Helfat & Peteraf, 2015; Pavlou & El Sawy, 2011; Schilke, 2014; Wilden et al., 2013). At the same time, the core-competence tradition warns that established strengths can harden into core rigidities, and that scaling requires the ambidextrous capacity to exploit existing operations while exploring new ones (Prahalad & Hamel, 1990; Leonard-Barton, 1992; Kogut & Zander, 1992; O'Reilly & Tushman, 2008; Gibson & Birkinshaw, 2004; Teece, 2014). The maturity model developed here can be read as a structured account of the operating-system capabilities a firm must both exploit and continually reconfigure as it scales.

7.2 Operations Strategy and Supply-Network Foundations

Operations-strategy scholarship provides the intellectual foundation for the coherence and process domains of the model. The field established that operating systems embody choices that must be internally consistent and aligned to competitive priorities, and that capabilities can accumulate cumulatively rather than only through trade-off (Ferdows & De Meyer, 1990; Hayes & Pisano, 1994; Schmenner & Swink, 1998; Swink & Hegarty, 1998; Wheelwright & Clark, 1992). Applied frameworks for coordinating business processes across stakeholders in regulated, multi-party operating environments illustrate the same coherence imperative in practice (Eyetsemitan et al., 2020). A substantial body of empirical operations research links disciplined management practices to performance, while emphasizing that the effect of any practice is contingent on context and configuration (Anderson et al., 1994; Flynn et al., 1995; Ketokivi & Schroeder, 2004; Schroeder et al., 2002; Sousa & Voss, 2008). Applied process-improvement work extends this logic to resource-constrained and growing organizations, showing how structured methods such as adapted Lean Six Sigma reduce cycle time and variability as firms scale their operations (Oyeleye et al., 2022). The supply-network domain rests on supply-chain-management scholarship that defines integration across organizational boundaries and links it to performance and collaborative advantage (Barratt, 2004; Cao & Zhang, 2011; Chen & Paulraj, 2004; Mentzer et al., 2001; Stevens, 1989). Applied supply-chain research in capital-intensive and high-risk operating environments extends these constructs to the management of network risk during large-scale project delivery and growth (Agbabiaka et al., 2019).

7.3 Information Processing, Digital Capability, and Organization Design

The information-processing view of organization design explains why scaling strains coordination. As volume, variety, and geographic spread rise, the information-processing demands on the organization grow, and structures that were adequate at small scale become bottlenecks (Lawrence & Lorsch, 1967; Thompson, 1967; Tushman & Nadler, 1978). Classic work on the co-evolution of strategy and structure, and on the fit between organizational form and environmental uncertainty, further implies that scaling firms must redesign structure and process in step with growth rather than after strain appears (Burns & Stalker, 1961; Chandler, 1962).

The digital-business-strategy and information-systems-capability literatures show that data and digital infrastructure have become fused with business strategy, such that the capacity to reconfigure operations digitally is itself a source of advantage (Bharadwaj et al., 2013; Vial, 2019; Wade & Hulland, 2004; Warner & Wager, 2019). Applied studies of enterprise procurement and data governance make the same point operationally, connecting integrated procurement platforms and governed data architectures to the reliability that scaled operation requires (Aliliele et al., 2025; Okonkwo et al., 2018).

7.4 Organizational Learning and Performance Measurement

The learning-systems domain draws on a mature literature that distinguishes single- and double-loop learning, the institutionalization of individual insight into organizational routine, and the balance between exploiting known practices and exploring new ones (Argyris & Schon, 1978; Crossan et al., 1999; Huber, 1991; Levitt & March, 1988; March, 1991). The learning-organization tradition further specifies the disciplines through which firms convert experience into improved capability, a process that is indispensable to sustaining performance as scale and complexity increase (Garvin, 1993; Senge, 1990). The performance-management domain is grounded in the performance-measurement-systems literature, which specifies how measures should be designed, balanced, and periodically updated to remain aligned with strategy as conditions change (Bititci et al., 2012; Bourne et al., 2000; Franco-Santos et al., 2007; Melnyk et al., 2014; Neely et al., 1995). This literature cautions that measurement systems decay if they are not maintained, which is precisely the risk that rapidly scaling firms face as their operations outgrow the metrics designed for an earlier stage.

7.5 Regional Ecosystems and Methodological Considerations

The framework also connects to the regional dimension of the scale-up problem. Because operational capability is unevenly distributed across places, the diffusion of standardized operational and infrastructure design models is itself a mechanism of regional development, and the resilience of regional economies depends in part on the operational capacity of the firms within them (Komi, 2025; Ogbete et al., 2026). A shared readiness language allows ecosystem actors to coordinate capability-building across firms, extending the benefit of the diagnostic from the individual enterprise to the regional system.

Positioning the model within these literatures clarifies how it should be validated. The maturity-model and design-science traditions call for demonstrating construct validity of the domains, reliability of the diagnostic instrument, and predictive validity against scaling outcomes, using both cross-sectional and longitudinal designs (Schilke, 2014; Wu et al., 2010). Establishing discriminant validity against adjacent constructs such as operational performance and firm size, and testing the constraint logic that the least mature critical domain governs outcomes, are priorities that the surrounding capability and measurement literatures are well positioned to support.

7.6 Cross-Sector Applied Evidence on Operational Capability

Applied research produced within professional operating environments corroborates several domains of the framework. Studies of procurement and contract governance, port and logistics efficiency, regulatory-compliance workflow design, and integrated lean-digital methods for scaling small-business operations show how disciplined operating practices translate into repeatable execution as organizations grow (Eyetsemitan et al., 2021; Eyetsemitan et al., 2025; Okonkwo et al., 2019; Okonkwo et al., 2020).

A second cluster of applied work concerns the data and digital foundations of scaling. Frameworks for enterprise data-sensitivity classification, data-protection governance, and AI-enabled IT general controls, together with predictive-analytics and demand-forecasting models and algorithmic process-optimization studies, illustrate how governed data and analytical capability support coordinated operation at scale (Aliliele et al., 2023; Aliliele et al., 2024; Mbonu et al., 2018; Mbonu et al., 2022; Tonoyan et al., 2021; Tonoyan et al., 2022).

A third cluster addresses performance measurement, workforce capability, and management systems across sectors. Work on multi-unit financial-performance prediction, workforce training models, internal audit and assurance systems, and a maturity model for predicting audit outcomes in resource-constrained settings reinforces the performance-management, workforce, and maturity-progression elements of the framework (Adeyelu & Dagodzo, 2024; Obogo et al., 2020; Obriki et al., 2022; Tonoyan et al., 2023).

A final cluster speaks to standardization, resilience, and the regional dimension. Studies of standardized and scalable service-network design, data-driven operational risk control in large-scale projects, near-miss data utilization for organizational learning, healthcare-infrastructure performance metrics for long-term asset management, the link between community trust and infrastructure durability, and real-time logistics optimization show that the operational-capability logic generalizes across sectors and up to the regional scale (Aminu-Ibrahim et al., 2025;

Arumosoye & Obriki, 2019; Komi & Adeniji, 2024; Obriki & Arumosoye, 2018; Ogbete et al., 2022; Tonoyan et al., 2025).

Applied research in financial governance and control provides a further body of cross-sector evidence. Studies of strategic accounting systems, automated financial consolidation and transparency, data-driven tax compliance, financial governance and accountability in small and medium enterprises, and data-led cost governance and predictive budgeting show how the measurement, control, and reporting disciplines of the performance-management domain operate in practice as organizations grow (Adesuyi et al., 2022; Adesuyi et al., 2023; Bola-Sadipe et al., 2019; Bola-Sadipe et al., 2022; Bola-Sadipe et al., 2023; Eboh et al., 2025; Filani et al., 2023; Odihi et al., 2026; Oluwo et al., 2025). Related work on budget compliance and statutory reporting, reconciliation control and financial-workflow redesign, automated close controls in public-sector ERP systems, audit liaison and corrective-action governance, and donor-evidence and accountability standards further specifies the control and audit mechanisms that governance at scale requires (Dogbatsey & Ebhojie, 2018; Dogbatsey et al., 2019; Dogbatsey et al., 2026; Ebhojie et al., 2023; Oyeleye et al., 2025).

A related cluster addresses treasury, forecasting, and strategic finance for growth. Work on tiered treasury architecture and foreign-exchange risk control, entrepreneurial training in emerging economies, CFO-led strategic finance in joint ventures and cross-border partnerships, post-pandemic strategic collaboration for resilience and recovery, and machine-learning-based underwriting connects financial and analytical capability to the strategic-coherence and data domains on which scaling depends (Dada et al., 2021; Dada et al., 2024; Isiekwu et al., 2021; Isiekwu et al., 2025; Oluwo et al., 2022; Oluwo et al., 2024).

Security governance and enterprise-systems research supplies evidence for the data and technology-integration domains. Conceptual models for insider-threat classification, risk-based cybersecurity assurance, identity-centric zero-trust architecture, privacy-centric security engineering, predictive maintenance for e-commerce systems, and enterprise directory and network management illustrate the governance and integration mechanisms through which digital infrastructure is made dependable at scale (Akeju et al., 2018; Fadayomi et al., 2019; Ladapo et al., 2018; Ladapo et al., 2019; Mayo et al., 2021; Ogbole et al., 2021; Okoruwa et al., 2020).

A final cluster addresses service operation, performance measurement, procurement, workforce, and project delivery. Work on KPI frameworks and revenue assurance, digital transformation of service delivery, automation and customer-centric innovation in utility and service operations, ESG-integrated sustainable procurement, human-resource development and career progression, and construction project delivery through risk modeling, digital-twin monitoring, and scheduling optimization demonstrates that the process, workforce, and performance domains generalize across sectors and delivery contexts (Ajirotutu et al., 2019; Ajirotutu et al., 2023; Feboh et al., 2018; Nnabueze et al., 2023; Nnabueze et al., 2024; Okafor et al., 2025; Okojie et al., 2020; Sakyi et al., 2022; Sakyi et al., 2023; Sakyi et al., 2024).

8. Limitations and Future Research

The framework is a theoretically grounded artifact whose empirical validation remains to be established, and this is its principal limitation. The propositions specify the relationships the framework asserts, but they require testing. A staged empirical program is indicated. Content validity and the behavioral anchors should first be refined through expert review and pilot application. Construct validity and the domain structure should then be examined through assessment of a sample of firms, testing whether the seven domains are empirically distinguishable and whether the readiness profile behaves as the constraint logic predicts. Predictive validity should be examined by relating readiness profiles to subsequent scaling outcomes, ideally longitudinally, to test Propositions 1 and 2. The moderating relationships in Propositions 3 through 7 require designs that capture firm context and the sequence of capability development.

A second limitation concerns generalizability across contexts. The contextual moderators identified above imply that the interpretation of readiness profiles is contingent, and empirical work should establish how the binding-constraint distribution varies across sectors, technology intensities, and business models. A third limitation concerns the measurement of scaling outcomes themselves, which are multidimensional and unfold over time; robust operationalization of sustained, quality-preserving growth is necessary for credible tests. Finally, the framework focuses on firm-level operational readiness and treats ecosystem conditions as external moderators; integrating firm-level readiness with ecosystem-level analysis is a promising direction that could clarify how internal capability and external support jointly determine scaling.

Beyond validation, several extensions merit attention. The framework could be specialized into sector-specific variants with tailored indicators, developed into a longitudinal capability-development methodology that guides firms through successive maturity transitions, and connected to the design of ecosystem interventions through field experiments that test whether readiness-targeted support improves scaling outcomes relative to undifferentiated support. Each extension would strengthen the practical value and the evidentiary base of the framework.

9. Conclusion

The scale-up gap is commonly attributed to shortfalls in capital, talent, infrastructure, and policy. This paper has argued that an equally important and comparatively underexplored contributor is operational: firms frequently possess viable technologies, receptive markets, and adequate resources yet fail to scale because they lack the operational capabilities and implementation systems required to absorb and sustain growth. Reframing the scale-up challenge as a problem of operational execution has practical consequences, because operational capability, unlike resources acquired, must be deliberately built. To make that reframing actionable, the paper developed the Operational Scale-Up Readiness framework and an associated maturity model that decomposes readiness into seven capability domains, articulates each across five progression levels, and yields a diagnostic instrument that produces a readiness profile, identifies the binding constraint on a firm growth, and prescribes an improvement path. The framework is grounded in the resource-based view, dynamic capabilities, absorptive capacity, and organizational-readiness theory, and it is designed in accordance with established principles for rigorous maturity models. Its central diagnostic insight is that scaling is limited by the least mature critical domain, so that identifying and relieving the binding constraint is more valuable than pursuing undifferentiated improvement. Because the resulting artifact is generic and transferable, it constitutes public knowledge that firms, investors, accelerators, and economic-development organizations across sectors and regions can adopt to strengthen their capacity to scale high-impact enterprises. The framework awaits empirical validation, and a staged program to establish its construct, predictive, and comparative validity has been specified. If validated, it offers a structured pathway for building the operational foundations that scaling requires, and in doing so it addresses a durable constraint on the translation of innovation into sustained economic value.

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