

Organizational scaling, scalability, and scale-up: Definitional harmonization and a research agenda

Nicole Coviello^{a,*}, Erkko Autio^b, Satish Nambisan^c, Holger Patzelt^d, Llewellyn D. W. Thomas^e

^a Lazaridis School of Business and Economics, Wilfrid Laurier University, Canada & LUT Business School, LUT University, Finland

^b Imperial College Business School, Imperial College London, England

^c Weatherhead School of Management, Case Western University, United States of America

^d TUM School of Management, Technical University of Munich, Germany

^e IESE Business School, University of Navarra, Spain

ARTICLE INFO

Keywords:

Scaling
Scalability
Scale-up
Entrepreneurship
Systematic review
High growth

ABSTRACT

The concepts of 'scaling,' 'scalability,' and 'scale-up' are increasingly used in business research and practice. However, the literature reveals a range of definitions for each, and often, their meanings are only implied. This diminishes the ability to build cumulative and meaningful insight - and conduct research - on each concept. In this editorial, we offer a systematic review that assesses and harmonizes prior definitions of these important concepts. This allows us to define and differentiate between (a) scaling as an organizational process, (b) scalability as an ordinary organizational capability, and (c) scale-up as a phase of organizational development. Complementing and extending existing scholarly work, we develop a rich agenda for scaling-related research in entrepreneurship.

Executive summary

The general idea of operating 'at scale' has been discussed across many disciplines, ranging from computer science and networks to engineering, biology, and business. Our interest is the latter in terms of what scaling, scalability, and scale-up mean in the context of a business organization. This interest stems from our observation that the meanings of these different concepts are often implied rather than articulated, and it is often unclear if scaling is the same as growing or if its outcomes pertain to growth, economies of scale, or returns to scale. This confusion is especially concerning given the increase in scaling research; an increase that reflects the interest in so-called 'scaling' firms that is also shared by practitioners and policymakers.

Although there are other special issues and editorials on this topic, we sought clarity in the meanings and complexities of scaling, scalability, and scale-up, rather than, for example, high-growth firms more widely, or scaling in specific contexts such as international business. We also wanted to stimulate entrepreneurship-focused research on topics ranging from how firms scale, to what scalability requires, and what it means to a firm if it is in the scale-up phase. As such, we were interested in how these concepts are defined, how and when scaling happens, as well as who and what it might involve or impact.

In this editorial and introduction to the special issue, we offer a systematic review of how prior research defines the concepts of scaling, scalability, and scale-up. Based on our synthesis and critique of extant definitions, we argue first, that scaling is an

* Corresponding author.

E-mail address: ncoviello@wlu.ca (N. Coviello).

organizational process whereby managers rapidly expand a firm's outputs by transforming the internal organization and leveraging digital resources without a corresponding *ex-ante* increase in inputs. This process supports a distinct type of growth. Second, scalability is an *ordinary organizational capability* developed by managing and achieving coherence among a firm's technological architecture, organizational architecture, and business model. Scalability facilitates the scaling process, and we argue that it is an ordinary organizational capability. Third, scale-up is a *phase of organizational development* wherein a firm is actively engaged in the scaling process. If firms are in this phase, they are considered scale-ups. These three distinct yet inter-related definitions harmonize and extend prior conceptualizations and we develop a rich agenda for research on scaling, scalability, and scale-up. We also offer implications for practitioners and policymakers.

1. Introduction

Over the years, scholarly and practitioner interest has expanded from understanding small businesses to examining 'entrepreneurial' firms that seek to achieve high growth in their sales, employment, or perhaps market value. Early examples of such firms were referred to as gazelles (Birch, 1981) and unicorns (Lee, 2013). Today, we read about 'decacorns,' 'scalars,' and 'scale-ups.' Practitioner-focused books on scaling organizations have also been published (e.g., Hoffman and Yeh, 2018; Sutton et al., 2016), and practitioner interest is evident by the range of 'scaling' programs offered by accelerators and universities around the world. There has also been significant growth in scaling-related research, particularly in recent years.

Of interest here is that current rhetoric seems to imply that managers no longer 'grow' their businesses. Rather, it suggests managers 'scale' their firms, firms need 'scalability,' and growing firms are now 'scale-ups.' Unfortunately, the meanings of these different concepts are often implied rather than articulated, and it is often unclear if scaling is the same as growing (Coviello, 2019). Consequently, scaling-related research is characterized by a proliferation of inconsistent and loose terms that diminish the development of meaningful cumulative insight, be it theoretical or practical (Palmié et al., 2023). This is especially concerning given the increase in scaling research; an increase that reflects the interest in so-called 'scaling' firms. These organizations generate attention because they can disrupt markets and become large global players with market dominance. At the same time, their path to success is complex and challenging (Gulati and DeSantola, 2016; Halaburda and Oberholzer-Gee, 2014; Rayport et al., 2023).

The potential for definitional confusion about what scaling, scalability,¹ and scale-up mean - both independently and relative to the general concept of growth - combined with scholarly and practitioner interest in the general area, motivated this *Journal of Business Venturing* Special Issue. Although there are other special issues and editorials on this 'hot topic,' we sought a rich understanding of the meanings and complexities of scaling, scalability, and scale-up, rather than high-growth firms more widely (see Jansen et al., 2023, *Journal of Management Studies*) or scaling in specific contexts such as international business (see Tippmann et al., 2023a, *Journal of World Business*). Further, although Palmié et al.'s (2023) review identifies different categories of scaling and they develop useful measures to assess scaling as an outcome, we believed it important to adopt a broader view to stimulate entrepreneurship-focused research in this area. More specifically, we wanted to investigate how prior work defines each concept to better understand and guide research on, for example, how and when scaling happens, who and what it might involve or impact, what scalability requires, and if and when a given firm would qualify as a 'scale-up.'

In this editorial, we introduce the five papers selected for the *Journal of Business Venturing*'s Special Issue. Consistent with our broad perspective on scaling, these papers exemplify research on a diverse range of scaling-related topics, including a deeper understanding of the scaling concept (Bohan et al., 2024), managerial decision-making for scaling platforms (Varga et al., 2023), the effect of venture scalability on IPO success (Somaya and You, 2024), employee experiences when scaling (Genedy et al., 2024), and founder preparation for the scaling process (Van Lancker et al., 2023). To begin, however, we offer a systematic review of how extant research defines the concepts of scaling, scalability, and scale-up. We do so at a time when scaling-related research is flourishing, and a variety of definitions and interpretations are emerging. To reduce existing definitional confusion and avoid the potential implications experienced in other fields (e.g., international entrepreneurship research on born globals; see Coviello, 2015), we assess and harmonize extant views of scaling, scalability, and scale-up to offer three distinct yet inter-related definitions that provide the basis for our research agenda. Together, our definitions offer a more holistic conceptualization of key terms associated with organizational scaling.

We argue, first, that scaling is an *organizational process* whereby managers (a) rapidly expand a firm's outputs by (b) transforming the internal organization and (c) leveraging digital resources without (d) a corresponding *ex-ante* increase in inputs. Together, these four components of our definition manifest in a type of growth that is qualitatively and quantitatively different from the definitions offered by prior editorials. For example, Jansen et al. (2023) argue that scaling is exponential growth and Tippmann et al. (2023a) view it as persistent and rapid replication of the firm's business model. Our definition highlights internal change and digitalization. Critically, it also emphasizes that scaling generates 'returns to scale.' Thus, although we appreciate Palmié et al.'s (2023, p 2) argument that scaling involves an "increase in the size of a focal subject that is accompanied by a larger-than-proportional increase the performance resulting from the said subject," they also reason that a business is scaling if the outcome of $[\text{performance}(t1) / \text{performance}(t0)] / [\text{size}(t1) / \text{size}(t0)]$ exceeds 1. This formula has the benefit of precision, but it also suggests that scaling can be 'negative growth' if the subject size shrinks more quickly than its performance.

Second, we define scalability as an *ordinary organizational capability* developed by managing and achieving coherence among a

¹ We use 'scalability' rather than 'scaleability' as it is more commonly used and is the preferred spelling in many dictionaries. However, scaleability is also appropriate because it refers to the potential of a system to increase in size or complexity without significant changes to its underlying structure (<https://thecontentauthority.com/blog/scaleability-vs-scalability>; retrieved 27/11/2023).

firm's technological architecture, organizational architecture, and business model. Scalability facilitates the scaling process, and we argue that it is an ordinary organizational capability due to the close alignment with Teece's (2014) view of ordinary (vs. dynamic) capabilities. Palmié et al. (2023) do not define scalability and relative to other editorials, we disagree with Jansen et al.'s (2023) argument that scaling is a dynamic capability (see later discussion). Our view is that in the same way that scaling is about more than 'running faster,' scalability is about how the firm can 'run different.' As such, although Tippmann et al., 2023a argue that scaling delivers the business model, we argue the opposite: the business model delivers scaling when it is managed *together with* changes to *both* the firm's organizational and technological architectures. This means that scalability (not the business model or digitalization per se) delivers scaling, and our arguments regarding the dimensions of scalability provide the basis for understanding how to make scaling happen.

Third, we define scale-up as a *phase of organizational development* wherein a firm is actively engaged in the scaling process. If firms are in this phase, they are considered scale-ups. Although the earlier editorials do not define scale-up, both Jansen et al. (2023) and Tippmann et al. (2023a) use the term to refer to a type of firm. Jansen et al. (2023) also use it as a verb (e.g., to scale up), as does the review by Palmié et al. (2023). In contrast, our definition of scale-up as a phase of organizational development allows us to understand how and where it fits in the wider process of a firm's evolution.

2. Background

The general idea of operating 'at scale' has been discussed across many disciplines, ranging from computer science and networks to engineering, biology, and business. Our interest is the latter in terms of what scaling and its related concepts mean in the context of a business organization. From the early work of Smith (1976 [1776]) on factors contributing to the wealth of nations, and subsequent foundational work such as Chandler (1990), we know that economies of scale are the cost advantage that come from the [increased] scale of an organization's cumulative outputs: the greater the cumulative number of a given product that the company has produced, the lower the per-unit production cost will be for that product.² Given economies of scale are dependent on growth in outputs, it is perhaps not surprising that when interest in scaling emerged, it was commonly associated with (and referred to as) growth. Some also started referring to growing firms as scale-ups, as seen in Coutu's (2014) *Scale-Up Report on UK Economic Growth* and the related decision of the UK's ScaleUp Institute to relabel the OECD's concept (2007) of high-growth firms as scale-up firms.

A key point arises from the above: economies of scale are related to – yet distinct from – returns to scale. The latter pertain to the relationship between, for example, an increase in output (such as revenue) relative to associated increases in inputs (such as costs). More positive returns to scale means that an increase in output is not matched by a concomitant increase in costs. As suggested by Palmié et al. (2023, p. 2), the idea of returns to scale distinguishes scaling from growth because "growth refers to the increase of a focal indicator in isolation." Although Coviello (2019, p. 15) notes that "you can't be a scale-up without growing, but you can be growing and not be a scale-up," Palmié et al. (2023, p. 1) observe that "...existing studies implicitly or explicitly define scaling very differently." We suggest the same concern applies to the concepts of scalability and scale-up. The overall problem is exacerbated by a rapid increase in both scaling-related research and interest from practitioners and policymakers. This led us to ask: *In this relatively new area of entrepreneurship research, how can extant definitions of these concepts be synthesized and harmonized to provide benchmark definitions for future use?*

3. Method

To identify and track development of the nascent yet fast emerging research on scaling and its related concepts, and help identify assumptions and misconceptions in prior work, we conducted an 'inventory' review per LePine and Wilcox-King (2010). Our approach involved a synthesis and interpretation-based evaluation of the extant definitions for scaling, scalability, and scale-up. We combined best practice in systematic literature reviews (Bacq et al., 2021; Tranfield et al., 2003) with an inductive method of thematic analysis.

We began with an iterative scoping process using Google Scholar. This process identified various types of publications (journal articles, book chapters, white papers, policy papers, media reports) so that we could assess the nature of scaling-related research in the business and management literatures. The scoping process involved one member of the author team and one additional scholar. We then developed our search protocol for the review (see Appendix A). The relevant keywords were identified to be: 'scaling,' 'scalability,' and 'scale-up' (also 'scaleup,' 'scale up,' 'scalable' and 'scaleability') in combination with any of the following: 'business,' 'organization,' 'firm,' 'new venture,' 'start-up,' 'startup,' 'SME,' 'business model,' or 'internationalization.' We refrained from using the term 'digital' in our search to generate a wide pool of articles. In contrast with Palmié et al. (2023), we did not search for 'economies of scale' because our search term 'scale' is in that phrase.

Rather than restrict our search to journals with the highest impact, we included all published and accessible journal articles from the Web of Science (Social Science Citation Index) database that (a) were in the business and management categories, and (b) met our selection criteria. Like Jones et al. (2011), we argue that this approach supports new and innovative ideas at an early stage of development in a research domain (see also Tranfield et al., 2003). At the same time, Web of Science does not include certain journals that were identified in our initial scoping process. We therefore followed Bacq et al. (2021) regarding the hand-selection of journals to

² We note here that early authors such as Fayol (original arguments in French, 1916; translated 1949) and Johnson (1982) implied that increasing the scale and efficiency of an organization also comes with multiple challenges and stress that require specific managerial attention. We return to this point later.

add to those identified by Web of Science. Two (*International Journal of Product Development*; *Journal of Business Models*) published some of the earliest research on scaling. A third (*Journal of Business Venturing Insights*) has also published scaling research.

As noted in [Appendix A](#) and following [Tranfield et al. \(2003\)](#), we focused on peer-reviewed journal articles that met all the inclusion criteria and none of the exclusion criteria. Of note, we chose to include prior review articles and editorials if they defined any of our concepts of interest. However, we excluded scaling-related research from business and management that pertained to, for example, computer systems and networks, social and non-profit ventures, and social innovation (e.g., [Tatarinov et al., 2023](#); [Busch and Barkema, 2021](#)). This is because each of these areas is a substantive field of study on its own. Other excluded topics included scaling-related articles on, for example, multi-dimensional scaling, AI, blockchain, bicycle traffic, and broiler chicken supply chains. Finally, because this is the editorial for a *Journal of Business Venturing* Special Issue, we excluded the five articles accepted for publication in it. These papers have either a 2023 or a 2024 publication date: [Bohan et al., 2024](#); [Genedy et al., 2024](#); [Somaya and You, 2024](#); [Van Lancker et al., 2023](#); [Varga et al., 2023](#). The earliest article identified in our review is [Hallowell \(2001\)](#) and we include articles until the end of 2023.

We conducted three separate searches, one for each concept. This resulted in a total of 90 publications addressing scaling, 38 for scalability, and 49 for scale-up. These are not necessarily separate articles because a study defining, for example, scale-up might also define one of the other concepts. If a paper addressed any one concept, it was manually assessed to identify definitions for all three concepts. The final corpus comprises 57 articles that define at least one of scaling, scalability, or scale-up. When we compared the definitions of the three concepts in higher versus lower impact journals, we found no obvious differences regarding the content, inclusiveness, and accuracy of definitions.

For scaling, our keyword search on the Web of Science database yielded 2204 articles with scaling in the title, keywords, or abstract. We then limited the search to articles or early access articles, and those in the fields of management or business. This reduced the pool to 403 articles. All titles and abstracts were read and checked, further reducing the pool to 90 articles. In the final step, each of these articles was reviewed to identify if and how scaling was defined.³ We found 35 articles offered a definition of scaling. For scalability, our keyword search yielded a smaller initial pool of 461 articles with scalability in the title, keywords, or abstract. We then limited the search following the procedures noted above, reducing the pool to 129 articles and then, 38 articles. Of these, 18 articles provide a definition of scalability. Finally, the keyword search for scale-up (also scale up or scaleup) resulted in 898 articles. This was reduced to 93 and then 49 articles, following the procedures noted above. Of the 49 articles, 17 define scale-up.

For our analysis, we treated the identified articles as our data ([Braun and Clarke, 2006](#); [Thorpe et al., 2005](#)). Although many systematic reviews analyze and code the data relative to a specific analytical framework or theory, typically reducing data to numeric values, [Macpherson and Holt \(2007\)](#) argue that such an approach de-contextualizes data and is overly deductive and reductionist. Although we provide summary (numeric) descriptions of our data, we also take an interpretive approach ([Tranfield et al., 2003](#)) whereby all members of the author team assessed the extant definitions for each concept. When necessary, we came to agreement on our coding through discussion. The resultant tables provided the basis for us to develop harmonized definitions for each concept and ensure that they are differentiated and defensible.

4. Descriptive results

As noted above, our final corpus is 57 articles, and aligned with [Bacq et al. \(2021\)](#), this provides a critical mass of papers for assessment. In terms of descriptive results, [Fig. 1](#) shows there has been significant growth in research pertaining to our concepts of interest. Keeping in mind that we are focused on articles that define scaling, scalability, and/or scale-up, the growth trajectory shows a remarkable leap in 2023.⁴ This suggests that our timing for definitional assessment and harmonization is appropriate. [Fig. 1](#) also shows that the corpus is dominated by articles with definitions of scaling ($n = 35$) although there is a reasonable body of definitions for each of scalability ($n = 18$) and scale-up ($n = 17$).

[Table 1](#) presents the breadth of journals in our corpus with articles that define scaling-related concepts. The two top journals are *Technological Forecasting and Social Change* (12 %) and *Journal of World Business* (7 %). *Harvard Business Review*, *Journal of Business Research*, and *Journal of Management Studies* each comprise 5 % of the corpus. The range of journals in [Table 1](#) suggests that as a research topic, scaling is of equal interest to well-known journals (e.g., *Entrepreneurship Theory and Practice*, *Journal of International Business Studies*, *Strategic Management Journal*), practitioner outlets, and lesser known journals. As to be expected of concepts with strong practitioner origins, most of the early publications on scaling are found in *Harvard Business Review*.

Finally, [Fig. 2](#) shows that the articles in our corpus (again, articles with definitions) are dominated by qualitative studies (37 %). These range from single or multi-case studies to depth interviews. The emphasis on inductive insights is followed by conceptual papers (21 %), quantitative studies based on secondary data (14 %), and survey-based research (9 %). Another 5 % are based on anecdotal data and these are typically seen in practitioner journals. The remainder of the articles are based on mix-method studies, simulation modelling, review articles, or unspecified data (each with 4 %). The emphasis on qualitative and conceptual work is not surprising regarding the nascent state of scaling-related research.

³ Articles were excluded from our final analysis if the concept in question was (e.g.) not defined, was only in the title, abstract, or as a keyword but not in the paper itself, or it was discussed in a very specific context such as the product, AI, design, or customer service. We also excluded book chapters that appeared in the Web of Science search (despite our set parameters), articles that could not be accessed, and one article that was duplicated elsewhere.

⁴ This leap in research was not captured by the review of [Palmié et al. \(2023\)](#) given their dataset ended in 2022.

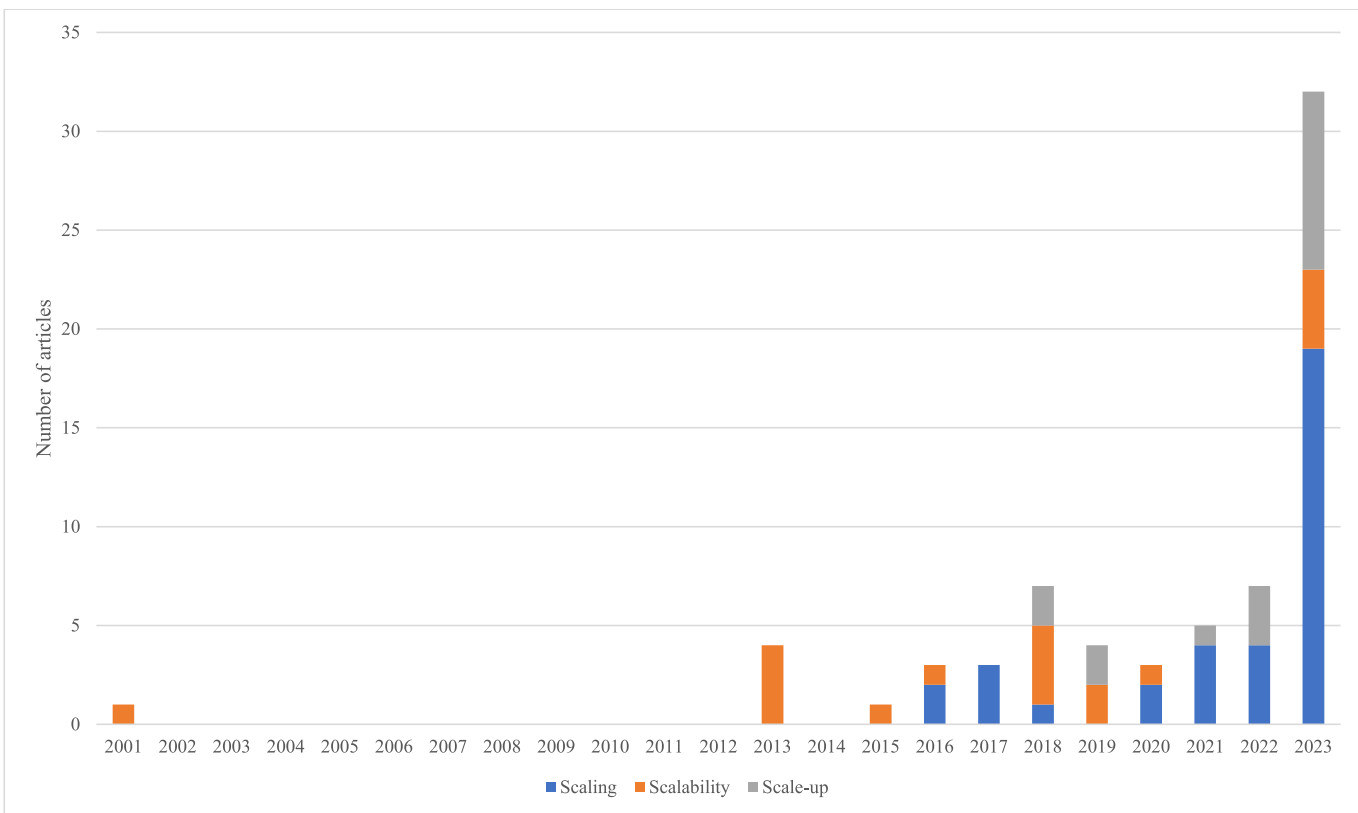


Fig. 1. Scaling-related research with definitions for scaling, scalability, and/or 'scale-up'.

Table 1
Source journals for articles with definitions (from Web of Science search).

Journal	Count	%
Technological Forecasting and Social Change	7	12
Journal of World Business	4	7
Harvard Business Review	3	5
Journal of Business Research	3	5
Journal of Management Studies	3	5
Business Horizons	2	4
Entrepreneurship Theory and Practice	2	4
Journal of International Business Studies	2	4
MIT Sloan Management Review	2	4
Organization Science	2	4
Strategic Management Journal	2	4
Technology Analysis & Strategic Management	2	4
Academy of Management Annals	1	2
Advances in Strategic Management	1	2
California Management Review	1	2
Electronic Commerce Research	1	2
European Journal of Innovation Management	1	2
European Management Journal	1	2
Global Strategy Journal	1	2
Innovation	1	2
International Entrepreneurship & Management Journal	1	2
International Journal of Product Development	1	2
International Journal of Service Industry Management	1	2
Journal of Business Models	1	2
Journal of Business Venturing	1	2
Journal of Business Venturing Insights	1	2
Journal of Organizational Change Management	1	2
Journal of Small Business Management	1	2
Long Range Planning	1	2
MIS Quarterly	1	2
RAUSP Management Journal	1	2
R&D Management	1	2
Science and Public Policy	1	2
Small Business Economics	1	2
Strategic Entrepreneurship Journal	1	2
TOTAL	57	100

5. Scaling

The first definitions of scaling appear in *Harvard Business Review* although they are quite distinct from each other (see Table 2). Carucci (2016, p. 2) defines scaling as “adding revenue at a much greater rate than cost.” In a different vein, Sullivan’s (2016) interview with Reid Hoffman (co-founder of LinkedIn and ex-COO of PayPal) focuses on the concept of ‘blitzscaling.’ They, along with Kuratko et al. (2020) and Büge and Özcan (2021), differentiate blitzscaling from ‘classic scaling’ based on the prioritization of speed over efficiency. Although Hoffman’s view of scaling references growth and scale (i.e., size) rather than returns to scale (per Carucci, 2016), it signals the need to attend to the organization while growing the customer base and revenues. In a similar vein, DeSantola and Gulati (2017, p. 641) argue that “the challenge of how to synchronize internal organizing and growth is often called the problem of scaling.”

Another potential aspect of scaling is seen in Huang et al. (2017, p. 302) who define scaling “as a generative process by which a venture’s user base increases significantly between two points in time through digital innovation.” This definition signals that scaling might be a process but like, for example, DeSantola and Gulati (2017), growth is emphasized. What separates Huang et al.’s (2017) definition from earlier efforts is their emphasis on digitalization. Yet another early definition (Picken, 2017, p. 2) views scaling as a phase where “the entrepreneur must add significant resources and leverage processes and partnerships to grow the business within the framework of the validated business concept and a sustainable business model.” Here, we see reference to (a) a phase of development, (b) investing to grow, and (c) a validated business concept or model.

The differences in these early definitions represent a clear pattern in the scaling literature. That is, as research on scaling evolved, so too have variations in how it is conceptualized. Indeed, our interpretation of the thirty-five definitions in Table 2 identifies eight main attributes used to define scaling. In order of appearance, scaling: (a) generates returns to scale; (b) creates growth in, for example, a

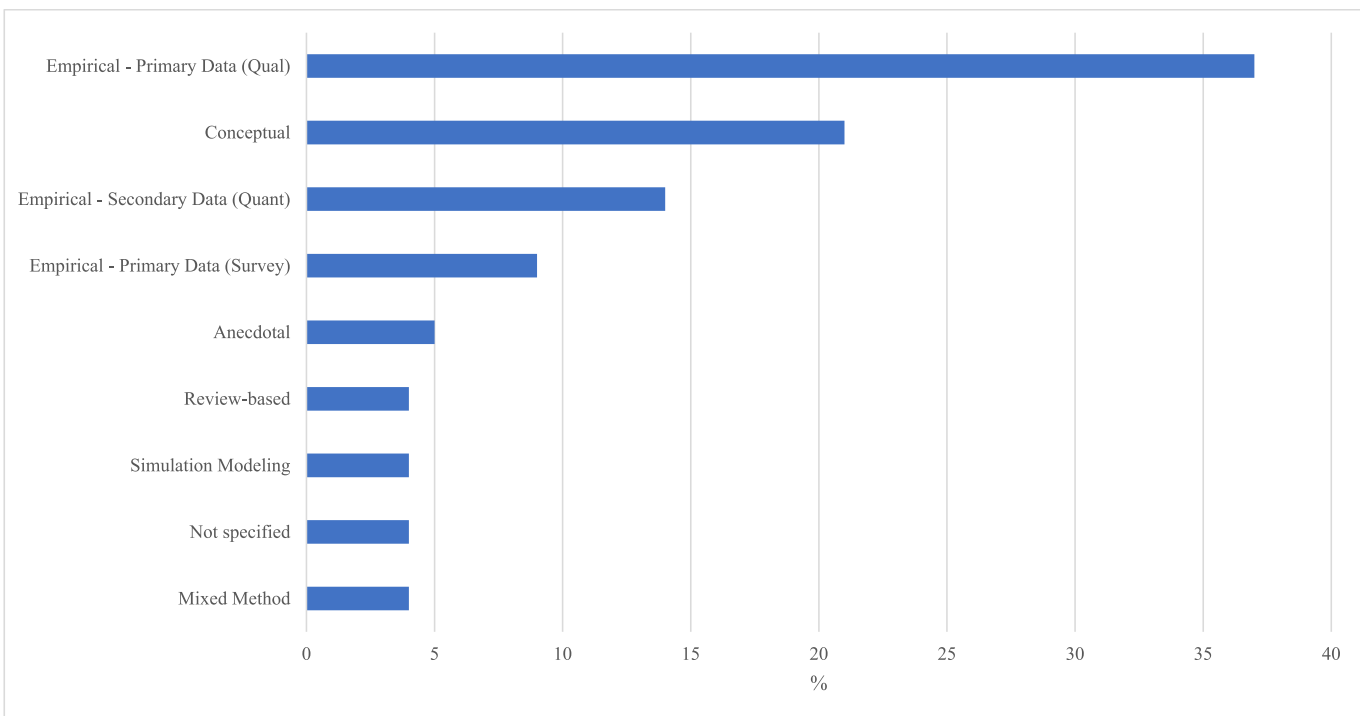


Fig. 2. Nature of data.

Table 2

Definitions of the term ‘scaling’ (chronological by year, alphabetical within year).

Year	Author(s)	Context	Definition	Main attributes used to define scaling ^a								
				Returns to scale	Growth	Internal elements	Investing to grow	Global markets	A process	Business model	Replication strategy	Persistent; over time
2016	Carucci (p. 2)	Mid-cap firms	“Scaling means adding revenue at a much greater rate than cost.”	X								
	Sullivan, (pp. 46–47)	Technology firms	“Blitzscaling is what you do when you need to grow really, really quickly. It’s the science and art of rapidly building out a company to serve a large and usually global market, with the goal of becoming the first mover at scale...There are three kinds of scale. People naturally focus on two of them: growing your revenues and growing your customer base....but very few businesses can succeed on those fronts without also scaling the organization.”		X (quick)	X	X	X				
2017	DeSantola & Gulati (p. 641)	Entrepreneurial ventures	“The challenge of how to synchronize internal organizing and growth.”		X	X						
	Huang et al. (p. 302)	Digital ventures	“...a generative process by which a venture’s user base increases significantly between two points in time through digital innovation.”		X				X			
	Picken (p. 2)	New ventures	“In the scaling phase, the entrepreneur must add significant resources and leverage processes and partnerships to grow the business within the framework of the validated business concept and a sustainable business model.”		X		X			X		
2018	Kohler (p. 100)	Crowdsourcing	“...the process of significantly increasing the quality and quantity of value-creating interactions among platform actors, without equally increasing the costs...”	X					X			
2020	Kuratko et al. (p. 110)	Technology ventures	“Classic business scaling occurs in a predictable environment with efficient scaling strategies ...blitzscaling prioritizes speed over efficiency in an environment of uncertainty” (per Hoffman and Yeh, 2018).		X (can be rapid)							
	Ott & Eisenhardt (p. 2276)	Early-stage technology ventures	“Scaling (i.e., growth)”		X							

(continued on next page)

Table 2 (continued)

Year	Author(s)	Context	Definition	Main attributes used to define scaling ^a								
				Returns to scale	Growth	Internal elements	Investing to grow	Global markets	A process	Business model	Replication strategy	Persistent; over time
2021	Büge & Ozcan (p. 43)	Platform businesses	Differentiates classic scaling from blitzscaling (like Kuratko et al., 2020).		X (can be rapid)							
	Piaskowska et al. (p. 3)	Unicorns and emerging unicorns with digital business models	"...scaling specifically involves the objective to attain economies of scale... [this] motivates small firms to grow fast... scaling occurs at a particular level of maturity in the organizational life cycle... scaling firms grow rapidly...."		X (rapid)							
	Reuber et al. (p. 1031)	Global business models	"...[global scaling is] a logic of multinationalization that seeks rapid growth through the replication of a global business model across foreign markets."		X (rapid)			X		X	X	
	Rong et al. (p. 3)	Sharing economy platforms (SEP)	"...SEPs need to attract an increasing number of users and expand their platform network base. We redefine the growth stage as Scaling-up stage for SEPs."		X							
2022	Rawhouser et al. (p. 1)	Blockchain technology ventures in developing countries	"...entrepreneurs' efforts to grow their ventures across markets...involves sustaining high rates of growth over an extended period of time while reducing the proportionate costs associated with this growth."	X				X				X
	Shepherd & Patzelt (p. 255)	Organizations	"...spreading excellence within an organization as it grows."		X	X						
	Snihur and Clarysse (2022, p. 14)	Technology-based new ventures	"...partial resource commitments, growing team, developing organizational identity, and focus on scaling of a chosen business model."		X	X	X			X		
	Weiss et al. (p. 2)	Technology ventures in Africa	Per DeSantola and Gulati (2017)		X	X		X				
2023	Belitski, Martin et al. (p. 1)	MNEs	"...the process of building and strengthening the internal capabilities, systems, and structures necessary to support and sustain growth... reflected in persistent rapid growth to deliver a viable business model" (per Shepherd and Patzelt, 2022 ; Tippmann et al., 2023)		X (rapid)	X	X	X	X	X		X
	Cavallo et al. (2023, p. 2)	Digital startups	"Scaling involves: (a) growing revenues, (b) growing the customer base, and (c)		X	X		X				

(continued on next page)

Table 2 (continued)

Year	Author(s)	Context	Definition	Main attributes used to define scaling ^a								
				Returns to scale	Growth	Internal elements	Investing to grow	Global markets	A process	Business model	Replication strategy	Persistent; over time
			adapting the firm to serve a large and usually global market (per Sullivan, 2016).”									
	DeSantola et al. (p. 1)	Young ventures	“Professionalization—the dynamic process through which fledgling enterprises come to mirror the modes of organizing of established corporations in their field”			X			X			
	Giustiziero et al. (p. 18)	Digital firms	“When the resource bundle is scalable ($\sigma > 1$), scalability begets specialization, which begets even more scale...the focused allocation of resources to a given activity can increase output exponentially, which incentivizes firms to accumulate larger resource bundles and grow their resource base exponentially, an outcome we refer to as hyperscaling.”		X (hyper)							
	Iurkov et al. (p. 1)	Public firms	Per Jansen et al. (2023)		X (rapid; exponential)	X	X				X	X
	Jansen et al. (p. 10)	High growth firms	“...the organizational and strategic routines by which firms grow exponentially through the expansion, replication, and synchronization of resources and practices over time.”		X (exponential)	X						X
	Lange et al. (p. 1)	Digital startups	Per Reuber et al. (2021)		X (rapid)			X		X	X	
	Maresch et al. (p. 2)	New ventures	“...the rapid expansion of the venture’s operations by replicating its business model.”		X (rapid)					X	X	
	Mihailova (p. 11)	Born digitals	“(1) generates exponential revenue by expanding its customer base by retaining existing and acquiring new users in large number of foreign markets; while (2) maintaining a lower increase of costs associated with customer retention and acquisition as well as those arising from organizational expansion.”	X				X				
	Mithani (p. 2)	Digital and non-digital financial service firms	“... a firm’s attempt to bring it to a competitive size (per Piaskowska et al., 2021) and typically entails a focus on increasing the economies of scale early in the firm’s lifecycle.”		X						X	

(continued on next page)

Table 2 (continued)

Year	Author(s)	Context	Definition	Main attributes used to define scaling ^a								
				Returns to scale	Growth	Internal elements	Investing to grow	Global markets	A process	Business model	Replication strategy	Persistent; over time
	Murray & Fisher (p. 247)	Early-stage drone ventures	"...a process...wherein entrepreneurs work to deliver initially intended products at scale and then leverage this achievement to gradually expand the scope of their ventures."		X							
	Palmié et al. (p. 2)	Firms in general	"...an increase in the size of a focal subject that is accompanied by a larger than proportional increase in the performance resulting from the said subject."	X								
	Rayport et al. (p. 58)	Startups	"In an often-overlooked stage of growth—extrapolation—successful start-ups ensure that each new customer brings in additional revenue and incurs only marginal cost."	X								
	Sanasi (p. 810)	Business models	"...the rapid increase of a new venture's user base without proportionate resource commitments."	X (rapid)								
	Sanasi et al. (2023, p. 1)	Technology startups	"...expanding the startup's target audience ceteris paribus, while keeping its value creation infrastructure the same."	X								
	Schou (2023, p. 3)	Science based ventures	Per DeSantola and Gulati (2017)		X	X						
	Shepherd and Williams (2023, p. 46)	Entrepreneurial organizations under adversity	Per Shepherd and Patzelt (2022)		X	X						
	Tippmann, Ambos et al. (p. 2)	Firms serving international markets	"...persistent rapid growth to deliver a viable business model...a process of delivering high growth over a period of time."		X (rapid)			X	X	X		X
	Tippmann et al. (p. 3)	Digital MNEs	Per Reuber et al. (2021); "Such firms are growing rapidly to quickly attain economies of scale and establish early mover advantages in global markets, while at the same time remaining innovative in fast-moving industries."		X (high)			X		X	X	

^a Other definitional attributes for scaling refer to it as having the goal of becoming the first mover at scale (Sullivan, 2016), or is enabled by digital technologies (Huang et al., 2017; implied by Giustiziero et al., 2023). Others view scaling as a dynamic capability (Iurkov et al., 2023; Jansen et al., 2023) or as a phase or stage (Picken, 2017; Piaskowska et al., 2021; Rong et al., 2021; Rayport et al., 2023). Finally, some definitions link scaling to economies of scale (Mithani, 2023; Piaskowska et al., 2021; Tippmann et al., 2023a) or being guided by managerial agency (Murray and Fisher, 2023; Picken, 2017; Rawhouser et al., 2022).

Table 3

Definitions of the term ‘scalability’ (chronological by year, alphabetical within year).

Year	Author(s)	Context	Definition	Main attributes use to define scalability ^a						
				An ability or potential	Returns to scale	Economies of scale	Enabled by technology	Enabled by the business model	Enabled by internal elements	Can expand without hindrances
2001	Hallowell (p. 35)	e-Commerce firms	“...a business’s ability to serve numerous additional customers at extremely low incremental cost.”	X	X					
2013	Sila (p. 204)	Firms adopting B2B e-Commerce	“...the economies of scale and scope provided by the Internet.”			X	X			
	Stampfl et al. (p. 229)	Business models of new technology ventures	“...a business model’s ability to increase revenues faster than the corresponding cost base” (per Hallowell, 2001).	X	X			X		
	Zhao et al. (p. 792)	New service ventures	“...the extent to which the venture has the potential to serve larger numbers of customers and decrease costs through the use of technologies, equipment, and centralized facilities.”	X		X	X		X	
	Zhao & Di Benedetto (p. 1098)	New service ventures	“...the service provider’s ability to expand its initial concept and scope such that it can reach a larger market-space and achieve scale economies.”	X		X				
2015	Zhang et al. (p. 3)	Digital business models	“...the extent to which a business model design may achieve its desired value creation and capture targets when user/customer numbers increase and their needs change, without adding proportionate extra resources.”	X	X			X		
2016	Bigdeli et al. (p. 506)	Business models of technology-based university spinouts	Per Zhao et al. (2013)	X		X	X		X	
2018	Kohler (p.118)	Crowdsourcing	Per Zhang et al. (2015)	X	X			X		
	Juntunen et al. (pp.20, 22)	Cloud business models	“...the ability to deal with business-volume related changes, business-space related changes regarding markets and customers, and business-model related changes in the business over time...generally rooted in the firm utilizing Internet based business opportunities.”	X			X	X		X
	Nielsen & Lund (p. 66)	Business models across sectors	“...a system’s ability to expand output on demand when resources are added... The first dimension of scalability is the degree to which increased input can create higher output. The second dimension of scalability relates to the ability of the business model to accelerate the returns on the additional investment.”	X				X		X

(continued on next page)

Table 3 (continued)

Year	Author(s)	Context	Definition	Main attributes use to define scalability ^a						
				An ability or potential	Returns to scale	Economies of scale	Enabled by technology	Enabled by the business model	Enabled by internal elements	Can expand without hindrances
	Rong et al. (p. 240)	Business models in the 3D printing industry	"...a company's capability to convince stakeholders that the value creation and value appropriation strategies established within the business model represent a 'good deal' for all parties, and thus foster close and positive working relations within the network."					X		
2019	Monteiro (p. 96, 103)	High growth firms	"...associated with a company's ability to grow rapidly without being hindered by the constraints imposed by its structure... characterized by activities or transactions that can be replicated in such a manner that the firm is able to increase its revenue at a rate faster than its costs, thus gaining scale"	X	X					X
	Nair & Blomquist (p. 273)	Business models of new technology ventures in incubators	"...the potential for replication at a larger scale" (per DeSantola and Gulati, 2017).							X
2020	Monaghan et al. (p. 18)	Born digitals	"...quickly able to build and leverage economies of scale in core business processes."			X			X	
2023	Giustiziero et al. (p. 7)	Digital firms	"...describes how the value accruing to the firm from using its resource bundle in a focal activity changes as the size of the bundle increases ... corresponds to the net effect of the supply-side returns to scale and demand-side returns to scale. We examine regimes where the resource bundle is scalable (its value per unit of output increases) versus non-scalable (value per unit of output decreases) as the size of the bundle increases."		X	X	X			
	Mihailova (p. 11)	Born digitals	Giustiziero et al., 2023 ; also "...the potential to scale."	X		X	X			
	Ramos & Pedroso (no p.)	Agtech start-ups	"...the gain in scale of operations derived from an increase in the number of customers associated with a lower evolution of operational costs compared with the increase in revenues."		X					
	Zhou & Verburg (p. 3)	Technology-based startups	"... the degree to which the new venture has the potential to scale up to a larger number of customers through the use of technologies and equipment" (adapted from Zhao et al., 2013).	X			X			X

^a Other attributes used to define scalability include it being a signal to the ecosystem regarding a firm ([Rong et al., 2018](#)) or a replication strategy ([Nair and Blomquist, 2019](#)).

firm's user base or revenue; and involves (c) changing internal systems and processes; (d) investing to grow; (e) serving the global market; (f) having a validated business model; (g) pursuing a replication strategy; and/or (h) being persistent.

The first attribute that emerges in Table 2 reflects the point that outputs are increasing without an equal increase in inputs (Carucci, 2016). Similar examples include Kohler (2018), Mihailova (2023), Palmié et al. (2023) and Sanasi (2023). Returns to scale are not, however, the primary attribute used to define scaling. Table 2 shows that although the returns to scale argument is in eight definitions (23 %), twenty-six (74 %) focus on growth of some sort including some that do not distinguish between scaling and growth (e.g., DeSantola and Gulati, 2017; Ott and Eisenhardt, 2020). Of these, many scholars refer to growth as being quick, rapid, or exponential (e.g., Lange et al., 2023; Maresch et al., 2023; Reuber et al., 2021). Twelve definitions (34 %) signal that scaling involves change to internal elements of a firm, and eight (23 %) refer to a validated business model. Ten definitions (29 %) refer to serving the global market or the definition is set in the context of international firms, six (17 %) refer to scaling as a replication strategy (e.g., Reuber et al., 2021), and five (14 %) refer to the need to invest for growth. A final five definitions (14 %) suggest that scaling is persistent over time (e.g., Belitski et al., 2023a; Rawhouser et al., 2022; Tippmann et al., 2023a).

Notably, extant definitions of scaling tend to emphasize growth alone, without referring to either economies of scale or returns to scale. This, unfortunately, reinforces the misperception that scaling is simply growth. Of course, a firm can pursue organic growth (where *ex ante* investment in manufacturing capacity is made for a firm to grow its operations), acquisitive growth (under which a firm expands operations by acquiring operations developed by others), or a hybrid of the two (McKelvie and Wiklund, 2010). However, we argue that for these strategies to be relevant to scaling, returns to scale must be generated.

In terms of time and timing, we reason that although some studies refer to persistent scaling, this is unlikely in that there will be some periods when a firm scales versus others when it simply grows, or alternatively, experiences stability or retrenchment. To some extent, this is seen in Tippmann et al.'s (2023a) argument that persistent scaling occurs for a period and not all the time. Our view is that scaling can occur and re-occur over time. Like other definitions in Table 2, we agree that scaling is rapid, but it may or may not be exponential (per Iurkov et al., 2023), and firms may or may not serve global markets.

If we consider organizational implications, only four definitions explicitly refer to scaling as a process (Belitski et al., 2023a; DeSantola et al., 2023; Huang et al., 2017; Kohler, 2018), and Jansen et al. (2023) present scaling as a dynamic capability.⁵ Nevertheless, most definitions imply that scaling is an activity requiring effort across the firm. To us, such arguments suggest that scaling involves change to the organization. Further analysis reveals that extant definitions tend to give agency to the firm, rather than its leaders or managers. This is notable given it is people that drive change in the internal workings of a firm; changes to, for example, organizational design, team composition, staffing, and organizational culture (DeSantola and Gulati, 2017; Weiss et al., 2022).

Finally, although 20 definitions (57 %) are set in the context of technology-based ventures, specific reference to the role of digital technologies is limited to Huang et al. (2017) and implied by Giustiziero et al. (2023). To some, this might suggest that scaling does not require digitalization, but digital affordances offer possibilities for not only pursuit of a replication strategy (per Tippmann et al., 2023b), but for a firm to re-think and re-design its technological architecture. One example involves migrating much or most of a firm's business infrastructure to the cloud (e.g., Autio et al., 2018). Doing so allows a firm to convert its output generation capacity from a fixed cost into a variable cost.⁶ This is because a firm's capacity for output creation adjusts virtually and instantaneously to growth and fluctuations in demand. From there, converting a firm's productive capacity from a fixed to a variable cost changes a firm's cash-flow models, capital requirements, and risk profile, all of which facilitates the scaling process. Following from the above, we argue that scaling is a process that generates a type of growth characterized by returns to scale. More specifically:

Scaling is an organizational process whereby managers transform the internal organization and leverage digital resources to rapidly expand a firm's outputs without a corresponding *ex-ante* increase in inputs.

6. Scalability

Influential practitioners Reid Hoffman and Chris Yeh (2018, p. 75) observe that "the wisest innovators design operational scalability into their theory." Similarly, in a recent assessment of patterns and assumptions in entrepreneurship research, although Dushnitsky and Matusik (2019, p. 442) do not define scalability, they state that it: "...is key to realizing entrepreneurial success. An entrepreneurial idea may have substantial potential, but it is not until it is deployed at scale that the potential is fully realized." However, what is scalability?

The earliest definition of scalability (see Table 3) is from Hallowell (2001), based on a continuum that distinguishes service firms selling information or data from those selling products requiring more physical handling. Hallowell (2001, p. 34) explains that the former are high in scalability while the latter are low because "the nature and quantity of physical service necessary to deliver value to customers influences the quantity of human intervention required, it also influences a firm's ratio of variable to fixed costs, which

⁵ We note however, that Jansen et al.'s (2023) argument is based on themes from a few select definitions in business and management research, along with research in social entrepreneurship and social innovation and capacity development. The three themes are: (a) expansion, (b) replication, and (c) synchronization. We understand how these themes might represent a dynamic capability but there are no measures to assess this, nor is there empirical data. Further, our analysis from Table 2 suggests that several themes (i.e., attributes) are missing from the argument underpinning Jansen et al.'s (2023) definition of scaling.

⁶ A firm could also outsource some of the more difficult-to-scale activities such as manufacturing. This recognizes that not all firms are 'born digital' (where most of the business structure is digital from launch) or 'born-again digital' (where much of the business infrastructure has been digitalized).

alters its scalability.” Three points are of note here. First, for contemporary firms selling data through the internet, the costs are already low from the outset and may not decrease as a function of production volume. Second, beyond classic service firms, the servitization of manufacturing firms suggest they too have the potential to exhibit scalability. Third, although Hallowell (2001) presents his arguments with the scale economies logic, his definition of scalability seems to refer, instead, to returns to scale.

Interestingly, the next definitions for scalability do not appear until twelve years later (Sila, 2013; Stampfl et al., 2013; Zhao et al., 2013; Zhao and Di Benedetto, 2013). Zhao et al. (2013, p. 792) define scalability as: “...the extent to which the venture has the potential to serve larger numbers of customers and decrease costs through the use of technologies, equipment, and centralized facilities. Scalability enables the venture to deliver the service offering at a lower cost and to exploit the potential to serve a larger number of customers than its competitors.” Zhao et al. (2013) also create a multi-item measure to operationalize the concept. To date, this is the only scale-based measure that we can identify for scalability. It assesses new service ventures’ opportunities for exploring scale economies, the extent to which the service is equipment based rather than people based, the extent to which the new venture can centralize operations, and the extent to which the service is technology based relative to that of competitors. This definition (also used by Bigdeli et al., 2016 and adapted by Zhou and Verbarg, 2023) is distinct from other early definitions because it indicates that scalability is enabled by both technology and the internal elements of a firm. However, this definition pre-dates recent technological advancements and appears to focus on economies of scale.

If we consider all the definitions from Table 3, many link scalability to a firm generating greater outputs at lower costs. Of these, eight (44 %) incorporate economies of scale into their definition (e.g., Monaghan et al., 2020; Zhao et al., 2013; Zhao and Di Benedetto, 2013), while seven (39 %) apply the returns to scale argument (e.g., Giustiziero et al., 2023; Ramos and Pedroso, 2023; Stampfl et al., 2013; Zhang et al., 2015). On the one hand, these patterns suggest that scalability is a performance metric or outcome. On the other hand, twelve (67 %) of the definitions in Table 3 consider scalability to be something a firm has the ability or potential to create (e.g., Hallowell, 2001; Juntunen et al., 2018; Nielsen and Lund, 2018; Mihailova, 2023). Although this could indicate that scalability is a process, we suggest that the concept better represents a firm’s ability to deliver a particular outcome (e.g., realized scaling per Mihailova, 2023; see also Palmié et al., 2023).

Separately, some authors (five; 28 %) indicate that scalability means a firm can expand on demand without constraints (e.g., Juntunen et al., 2018; Nair and Blomquist, 2019), and five (28 %) of the definitions refer *only* to some combination of (a) a firm’s ability or potential, (b) economies of scales or returns to scale and/or (c) unhindered expansion (e.g., Monteiro, 2019; Zhao and Di Benedetto, 2013). This is pertinent given the next three patterns that emerge.

First, fourteen (78 %) of the definitions are situated in a technology context but of these, only seven (39 %) refer specifically to the role of [digital] technologies for scalability (e.g., Giustiziero et al., 2023; Juntunen et al., 2018; Sila, 2013; Zhao et al., 2013). Of these, Giustiziero et al.’s (2023, p. 2) definition (also used by Mihailova, 2023) focuses on the nature of a firm’s digital resources, where digital technology is considered more scalable than, for example, human capital. This link to digitalization is, of course, unsurprising given digital resources are scale-free (Adner et al., 2019) or “more scalable on average” (Giustiziero et al., 2023, p. 4). They therefore allow for: (a) rapid and low-cost sharing, reuse, and replication of digital components in the development of a firm’s offerings, and (b) easy and non-linear expansion of a firm’s interactions with multiple stakeholders, including suppliers, customers, and complementors. Accordingly, digital resources can allow a firm to harness the close-to-zero marginal cost of storing and sharing data on cloud computing infrastructures to rapidly expand operational capacity (including interaction systems). This signals the importance of a firm’s technological architecture to scalability.

Second, six (33 %) definitions suggest that scalability is enabled by a firm’s business model (e.g., Kohler, 2018; Stampfl et al., 2013; Zhang et al., 2015). That is, an appropriate business model can pre-orient a firm for scalability, if it, for example, transfers some of the firm’s value creation to data and other intangibles or leverages external ecosystems. Third, three (17 %) definitions of scalability acknowledge its internal implications (Bigdeli et al., 2016; Monaghan et al., 2020; Zhao et al., 2013). This is surprisingly low given arguments that the scaling process (discussed earlier) involves significant internal change (e.g., DeSantola and Gulati, 2017; Shepherd and Patzelt, 2022) whereby elements of a firm’s organizational architecture (such as people, operations, and organizational structure) may need to be transformed.

Our synthesis of the above suggests that a firm’s scalability can be actively developed. If scaling is a transformative organizational process whereby managers rapidly expand a firm’s outputs without a corresponding *ex-ante* increase in inputs, we argue that scalability is the organizational capability that underpins the scaling process. We consider scaling to be an ordinary organizational capability given how the definitions in Table 3 resonate with Teece (2014). That is, scalability involves “the performance of...functions that are (technically) necessary to accomplish tasks” (Teece, 2014, p. 328). Furthermore, the definitions in Table 3 support “technical fitness” (Teece, 2014, p. 342) and “doing things right” (p. 311).⁷ They also suggest that scalability can be measured against specific requirements, and it can increase a firm’s operational scope and efficiency. Critically – and again consistent with Teece’s (2014) view

⁷ In contrast, Teece (2014) explains that dynamic capabilities require orchestration of a firm’s resources to address and shape rapidly shifting opportunity landscapes (p. 328). Dynamic capabilities also support evolutionary rather than technical fitness (p. 342) doing the right things (p. 311) rather than doing things right. Therefore, our perspective is less of a fit with dynamic capabilities and more of a fit with ordinary capabilities.

of ordinary capabilities – scalability is a function of some combination of personnel, facilities, and equipment, processes and routines, and administrative coordination. Thus, it encompasses the firm's technological *and* organizational architectures. Also pertinent from the review is the importance of a firm's business model. We suggest it is critical to find the right balance among these three elements so that they reinforce one another in support of the scaling process. As such, our definition of scalability is:

Scalability is an ordinary organizational capability developed by managing and achieving coherence among a firm's technological architecture, organizational architecture, and business model.

Our definition refines early arguments from [Hallowell \(2001\)](#) and [Zhao et al. \(2013\)](#) and harmonizes the others in three ways. First, by viewing scalability as a specific type of organizational capability, we take the concept beyond being simply an ability or potential, an organizational characteristic, or an outcome. Rather, scalability is a core capability to be developed and managed over time. It underpins the firm's scaling process and efforts to generate returns to scale. Second, scalability requires the active management of technologies (e.g., digitalization; see [Gradillas and Thomas, 2023](#) for a review) *together with* various internal organizational elements *and* the firm's business model. We make this point explicit given prior definitions stress, for example, the role of digital resources (e.g., [Giustiziero et al., 2023](#)) but not if/how/why internal elements might either restrict or enable scalability. Third, increased scalability should, theoretically, precede and then facilitate a smoother and faster scaling process.

7. Scale-up

In contrast to research addressing the concepts of scaling and scalability, the concept of scale-up is quite recent. This may reflect the publication of [Coutu's \(2014\) Scale-Up Report on UK Economic Growth](#), and the influential report from Barclays Bank (aka *Scale-Up UK*) from [Hellmann and Kavadias \(2016\)](#). About the same time of these reports, various programs and organizations emerged, incorporating the term 'scale-up' into their name or program. Examples include ScaleUp Nation (Netherlands), the Lazaridis ScaleUp Program (Canada), and the Nordic Scalers Program and their Scale-up Labs (Norway).

The first definitions appear to be from [Juntunen et al. \(2018\)](#) and [Kohler \(2018\)](#). As seen in [Table 4](#), the former views scale-up as a type of growth strategy involving expansion to existing markets. Indeed, [Juntunen et al. \(2018\)](#) distinguish scale-up from scale-out, i. e., expansion to new markets. This perspective of scale-up as a strategy is also seen in definitions that reference the pursuit of economies of scale ([Piaskowska et al., 2021](#); [Maresch et al., 2023](#)) or market penetration ([Quas et al., 2022](#)). In contrast, [Kohler \(2018\)](#) views scale-up as a type of firm in a particular phase that exhibits high growth and has a validated business model. Indeed, of the 17 definitions we identify, most (14; 82 %) view scale-up as a type of firm, often in combination with other characteristics. For example, [Denney et al. \(2023\)](#), [Iurkov et al. \(2023\)](#), and [Monteiro \(2019\)](#) define scale-up as a type of firm with high growth. [Cavallo et al. \(2019\)](#) define it as a type of firm in a specific phase of development, and although [Bruneel et al.'s \(2022\)](#) definition is like [Cavallo et al.'s \(2019\)](#), they include having a validated business model. Although early definitions suggest that scale-up might be either a strategy or a type of firm, some combine these attributes (e.g., [Maresch et al., 2023](#); [Piaskowska et al., 2021](#); [Quas et al., 2022](#)).

A final observation is that six definitions of scale-up (35 %) refer to the [OECD \(2007\)](#) metrics for high-growth firms (e.g., [Belitski et al., 2023b](#); [Denney et al., 2023](#); [Strengers et al., 2022](#)). That is, they use the term scale-up to label firms with: 1) average annualized growth in revenue or employees >20 % over a three-year period; and 2) ten or more employees at the beginning of the observation period. Alternatively, [Iurkov et al. \(2023\)](#) and [Jansen et al. \(2023\)](#) offer their own (different) suggestions regarding metrics. We suggest that this type of metric-based definition is problematic for two reasons. First, using the [OECD \(2007\)](#) metric-based definition fails to recognize that it was not developed for that purpose. Rather, it was developed for high growth in general and not scaling firms per se. The same concern applies to the eight scale-up definitions (47 %) that emphasize having 'high growth.' Such definitions tend to generate questions such as 'what is meant by high' and 'is growth organic, acquisitive, or a combination of the two?' Second, using minimum benchmarks does not account for idiosyncrasies on a firm-by-firm or sector-by-sector basis. As one example, [Deloitte Fast 500 Technology Awards \(2023\)](#) assess fiscal year revenue growth for technology firms, with similar competitions are held worldwide. In 2023, the 'Top 10' firms in North America had an average growth rate of 44,148 % (2019–2022), with a range of 15,738 % to 222,189 %. Such growth rates eclipse the [OECD \(2007\)](#) definition and again, they focus only on growth (not scaling).

Overall, most of the studies in [Table 4](#) define the term scale-up as a type of firm that is in a certain stage of organizational development. They also assume that a firm's development is a linear process (as reflected in stage-type models). However, we return to our earlier point that a firm can be scaling at different points in time. This leads us to reason that a firm can be in the scale-up phase at one point in time, preceded or followed by a growth phase. Alternatively, it might be in a maintain and sustain (aka stay-up) phase that shifts to a scale-up phase, followed by a growth phase, and so on. We suggest too, that an early scale-up phase may involve increasing the customer base whereas a later scale-up phase may increase the diversity of a firm's offerings by recombining existing digital components in different ways to create new functionalities. To account for this, our definition of scale-up is therefore:

Scale-up is a phase of organizational development where a firm is actively engaged in the scaling process.

Accordingly, when firms are in the scale-up phase, they are considered 'scale-ups.' We do not view scale-up as a strategy. Further, if the 'type of firm' argument is applied, some might reason that a scale-up is a new business that has harnessed scalability to achieve returns to scale. However, we know from research on unicorn firms ([Piaskowska et al., 2021](#)) and MNEs ([Belitski et al., 2023a](#)), that firms in the scale-up phase are not limited to newer firms. Thus, any firm might, at some point(s) be in the scale-up phase and thus, be referred to as a scale-up.

Table 4

Definitions of the term 'scale-up' or 'scaleup' (chronological by year, alphabetical within year).

Year	Author(s)	Context	Definition	Main attributes used to define scale-up ^a						
				A type of strategy	A type of firm	Has high growth	Has a validated business model	A stage or phase	Uses OECD (2007) metrics	Uses unique metrics
2018	Juntunen et al. (p. 23)	Cloud businesses	"...the scale-up approach can be seen as a vertical market (i.e., existing markets or customer segment) and scale-out approach as a horizontal market (i.e., new markets or customer segment)."	X (growth)						
	Kohler (p. 104)	Crowdsourcing	"Scaleups, in general, are companies growing consistently and significantly...it means a platform reached critical mass on both the creator and customer side, and the venture validated their business model;" also viewed as a phase		X	X	X	X		
2019	Cavallo et al. (p. 28)	Digital new ventures	A distinct stage of growth: "...new ventures that already had received funding equal or over 1 million \$ (Series 'A')."		X			X		
	Monteiro (p. 103)	High growth firms	"A scale-up can be defined as an HGF whose accelerated cycle of growth and wealth creation is fundamentally based on the scalability of its business model."		X	X	X			
2021	Piaskowska et al. (p. 1)	Unicorns and emerging unicorns with a digital business model	"High-growth firms at an intermediate stage of organizational development (situated between the start-up and mature firm stage in the organizational life cycle), which pursue strategies that prioritize the attainment of economies of scale. Having passed their initial exploratory stage, settled on an offering and a viable business model (which is often digital), scale-ups are ready to grow rapidly."	X (economies of scale)	X	X	X	X		
2022	Bruneel et al. (p. 804, 818)	Startups	"3–6 years after founding"; "already have customers and a validated business model"		X		X	X		
	Quas et al. (p. 645)	Entrepreneurial ventures	"...entering a growth phase where they seek significant market penetration"	X (market penetration)	X	X		X		
	Strengers et al. (p. 116)	"Scale-up" per definition	"...a company that experiences accelerated growth and wealth creation over time, with an average annualized growth >20 % a year in employees or turnover over three years and with ten or more full-time employees (FTE) at the beginning of the observation period" per OECD, 2007.		X	X			X	
2023	Belitski, Martin et al. (p. 7)	Firms across age, size, and sector	"...organizations need to maintain a high level of growth (above 20 %) in sales or employment over at least three consecutive years to be identified as a scale-up."		X				X	

(continued on next page)

Table 4 (continued)

Year	Author(s)	Context	Definition	Main attributes used to define scale-up ^a						
				A type of strategy	A type of firm	Has high growth	Has a validated business model	A stage or phase	Uses OECD (2007) metrics	Uses unique metrics
	Belitski, Stettler et al. (p. 2)	Firms across age, size, and sector	"Firms with annualized growth of at least 20 % in sales and employment over a three-year period" per Eurostat-OECD (2007).		X				X	
	Denney et al. (p. 862)	Technology firms	"Sometimes referred to as high-growth firms, scale-ups are defined by sustained employment and revenue growth over time" per Eurostat-OECD; "...scale-ups are distinct from startups and early-growth firms."		X	X			X	
	Iurkov et al. (p. 2)	Public firms	"...firms that experience hyper-growth rates: annual growth that may go up to and above 40 % in employment or sales."		X	X				X
	Jansen et al. (p. 6)	High growth firms	"...those HGFs up to 10 years old that have grown to at least 50 employees or more by the tenth year of existence or at the year of measurement, whichever is less."		X					X
	Maresch et al. (p. 3)	New ventures	Per Piaskowska et al. (2021)	X (economies of scale)	X	X	X	X		
	Pisoni et al. (2023, p. 2)	Digital international new ventures	"...the scale-up phase includes expanding the business, once a solid and viable business model has been validated."	X (growth)			X	X		
	Ramos & Pedroso (no p. number)	Ag tech startups	"A start up that focuses on growing its business volume (or gaining scale) is called a scale-up. These companies are in the intermediate stage of organizational development, situated between the initial stage and the mature business stage in the organizational life cycle." According to the OECD (2007), "scale-up growth is at least 20 % in the last three years of operations."	X (growth)	X			X	X	
	Tippmann, Ambos et al. (p. 2)	(For profit) firms serving international markets	"...at least 20 % growth per annum in revenue or employees over three consecutive years" per OECD (2007)						X	

^a Other attributes used to define scale-up or scaleup refer to having received funding (Cavallo et al., 2019).

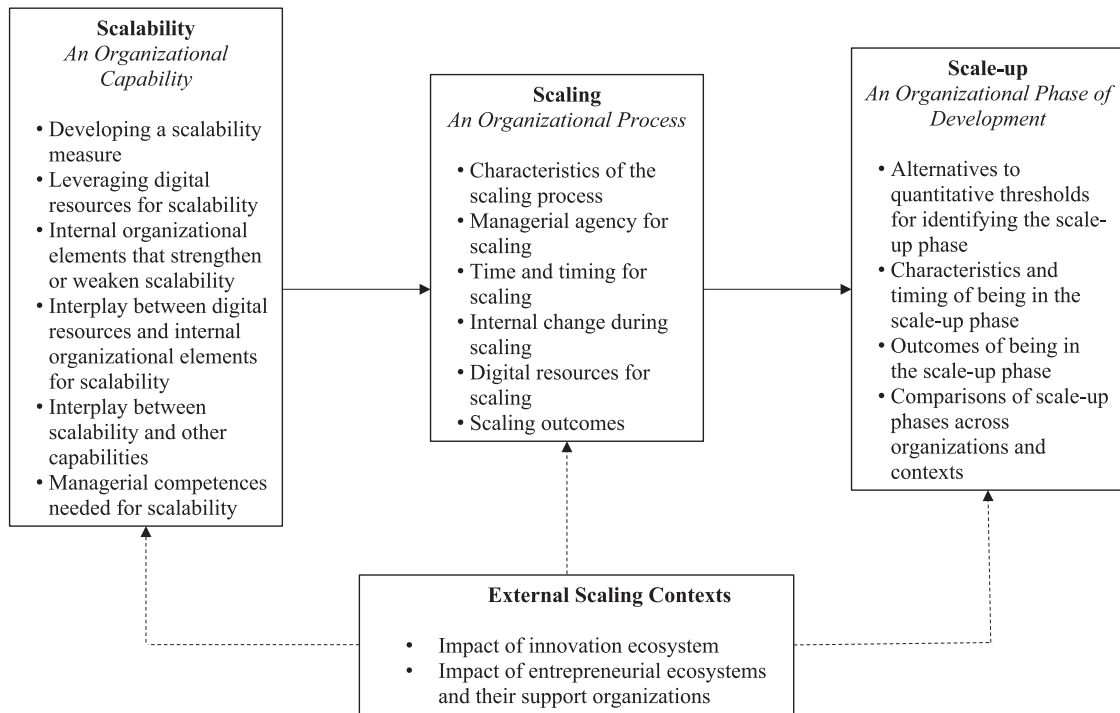


Fig. 3. Topics for research on scaling, scalability, and scale-up.

8. Discussion and implications

In this editorial, we have synthesized and assessed how scholars in the business and management literatures define scaling, scalability, and scale-up. This led us to develop contemporary and harmonized definitions for each concept. Our general view is that scaling is an organizational process that generates returns to scale. Its foundation is the organizational capability that we call scalability. And a scale-up is a distinct phase of organizational development that a firm may move in and out of. The relationships between these three concepts are presented in Fig. 3 where we also signal the relevance of scaling contexts external to a firm: innovation ecosystems and entrepreneurial ecosystems. In considering future research opportunities, we offer general and then more concept-specific suggestions.

8.1. General research opportunities

We support calls for a shift from cross-sectional to longitudinal studies (Jansen et al., 2023; Tippmann et al., 2023a) given the latter method can provide richer understanding of not only scaling as a process, but, for example, the implications of scale-ups being in a phase of organizational development that they can move in and out of. Longitudinal studies can also help us understand what happens before, during, and after scaling (including the questions of who, when, where, why, and how) and how the concepts of scalability, scaling, and scale-up are connected. For example, when and how do firms with scalability transition into the scaling phase? If they do not do so, why not? Furthermore, we support prior calls for (a) using multi-level models to capture the potential for multiplex influences on scaling-related issues, (b) studies on the potential negative consequences of the scaling process, building scalability, or being in the scale-up phase, and (c) a richer understanding of leadership and leaders in this context.

The finer-grained perspective offered by Jansen et al.'s (2023) five dimensions of scaling strategies also warrant research attention. The same applies to Tippmann et al.'s (2023a) discussion of scaling MNE initiatives vs. the MNE itself vs. the ecosystem, and Palmié et al.'s (2023) consideration of market, volume, financial, and organizational scaling. Based on the arguments of the latter two articles, scholars should take care to articulate where their research interest lies. It is, however, also important to consider whether one's focus is too narrow. For instance, Palmié et al. (2023) separate financial scaling from, for example, market scaling, but we reason that returns to scale in the former derive from change in the latter. Scholars should therefore acknowledge potential interrelationships among concepts.

Critically, we strongly encourage scholars to explicitly define the concepts of scaling, scalability, and/or scale-up in their research. This will help avoid conceptual confusion and facilitate the accumulation of a coherent body of knowledge on these phenomena. One of our key contributions is that we offer such definitions from a perspective that is (hopefully) broad enough to facilitate these efforts. We now turn to more specific research opportunities and in doing so, we introduce the articles of this special issue.

8.2. Opportunities for research on scaling

Given our definition of scaling, we see opportunities for research in numerous areas. First, much is yet to be understood about scaling as an organizational process. If we consider process theory (Van de Ven and Poole, 1995), is scaling best understood with a stepwise, teleological, dialectic, or evolutionary lens? Or is a combination of theoretical lenses more appropriate? Moving from theory to practice, if scaling is not linear and stepwise but rather, fraught with challenges to be overcome, what are the implications for the top management team and their various stakeholders? Either way, rich inductive research is required to unpack the nuances of scaling before quantitative assessment becomes meaningful. Using secondary data to proxy a process might be able to depict certain time-based patterns, but it can fail to show the micro-foundations of that process in terms of who is involved, as well as when, why, where, and how they are impactful.

Second, research is needed to understand managerial agency for scaling. Founders and managers initiate and drive the scaling process, but what motivates them to scale? When a firm starts the scaling process, which managerial practices need to be changed earlier rather than later? Does this vary, and if so, how, and why? How do managers address time compression diseconomies as they scale? On a related point, agency comes with cognition. How does managerial cognition shift as a firm moves into (or out of) the scaling process? This question relates to Varga et al.'s (2023, special issue) longitudinal case study of a well-known two-sided platform, [Takeaway.com](https://takeaway.com). Using an inductive theory elaboration approach, Varga et al. (2023) study how a platform's top management team members purposefully and repeatedly use and revise a portfolio of decision rules to cultivate indirect and data network effects. This allows the management team to initially facilitate the growth of their platform and over time, support the transition to scaling the platform over an extended period.

Third, if the scaling process is rapid, we note Jansen et al.'s (2023) call for research on the sequencing, pace, and rhythm of scaling. This mirrors calls for research on the process of entrepreneurial internationalization (e.g., Coviello et al., 2017) and suggests that given scaling is an organizational process, aspects of a firm might scale at different points in time. We therefore need to understand the sense of time and timing associated with scaling. Further, if we link rapid scaling to agency and managerial roles, what happens when the scaling process creates rapid change in, for example, the leadership team, employee numbers or markets served? This is addressed in part by Van Lancker et al. (2023, special issue). They study how founder roles evolve in preparation for scaling. Based on an in-depth case study and a combination of data collection methods, Van Lancker et al. (2023) show that for both founders and joiners to a firm, there are distinct phases when founder and/or joiner role-crafting takes place. Further, founder roles are (re)shaped through both types of role-crafting, and the authors identify three scaling-specific paths through which the role-crafting of joiners shapes the roles of founders.

Fourth, we argue that firms in the scaling process are likely to undergo internal change (also associated with the concept of scalability discussed below). The issue of internal change is implied by Fayol (1949) in his principles of management, and Johnson (1982) in his discussion of the scale-complexity relationship in organizations. The topic is broad in scope, but we suggest, beyond Palmié et al.'s (2023) questions such as, *inter alia*, is there a personal leadership style appropriate to scaling, and what is the role of resilience during this process, scholars could assess if and how management and leadership styles within the founding or management team change during the scaling process. Is a scaling mindset required of the leadership team? Of a firm's employees? Does a firm's reward philosophy matter when it is trying to scale, and how does it change during the scaling process? Structurally, what is the role of cross-functional integration in the scaling process? What are the implications of having a high proportion of remote workers or geographically distant teams? How do managers decide which internal roles, processes, or practices to change before or during the scaling process? As we move to the next point regarding digitalization, keep in mind that many firms have physical elements in their business model and are not fully digital or in the cloud. Thus, significant adjustments may be needed to a firm's organizational architecture because non-digital systems and resources are not inherently scale-free. This will impact a firm's ways of working when it is scaling.

Fifth, we consider digital resources – now ubiquitous in contemporary business. The purest form of scaling might occur entirely in digital infrastructures (e.g., cloud computing) but there is a wide range of digital resources available. Which are generally relevant to the scaling process? Why? Does this change pre-, during, and post-scaling? How? Why? And although the integration of digital resources can provide economies of scale and scope, are there other, digitally driven dynamics that need to be considered for scaling? Returns to scale are relevant, but so too might be the economies of transaction, search, or complementarity provided by digitalization. It might also be that firms that are, for example, fully in the cloud will experience network effects that speed up the need to scale. This sense of a 'need for speed' might be present even if a firm incorporates smaller components or aspects of digitalization. What are the implications of this? And is continued digitization needed while scaling (per Piaskowska et al., 2021) or is it "relatively inconsequential compared to how a firm responds to the need for replication and entrepreneurship" (Tippmann et al., 2023b, p. 31)? We also recognize that new technologies that drive digitalization are emerging. With the global race to develop artificial intelligence (AI) for widespread use, future research needs to explore scaling as it relates to AI, and how AI influences scaling (see also Palmié et al., 2023; Sjödin et al., 2021).

Last, but not least, we strongly encourage scholars to shift their focus to consider returns to scale (rather than the 'growing' firms and scale economies arguments). This applies to not only organizational performance at a general level, but more specific decisions or actions. For example, returns to scale can be assessed for the decision to automate or standardize certain processes, or the decision to invest in increased cloud capabilities. Our position regarding returns to scale is reinforced by the arguments of Bohan et al. (2024, special issue). They apply a mathematics lens to define scaling in the business context as a time-limited process of exponential growth. They also identify various drivers of scaling and demonstrate why scaling requires internal transformation. Bohan et al. (2024) ultimately show that scaling for competitive advantage requires increasing returns to scale in input-output relationships. We agree but

note that although the scaling process rapidly increases the size of a firm's operational and interaction systems, and it may drive outcomes like returns to scale (not to mention revenue growth or increased market capitalization), this does not occur automatically. For example, firms with small headcounts (e.g., SuperCell – creator of the Clash of Clans game) might be able to scale and quickly generate significant revenues. In contrast, others such as Facebook, Amazon, and Uber scaled to a significant size (along with employee headcount) yet struggled with monetization and profitability. We have much to learn from firms in both categories.

8.3. Opportunities for research on scalability

Scalability is the least studied concept in our review, based on the pool of articles we generated. It is, however, the focus of [Somaya and You \(2024, special issue\)](#), who argue that venture scalability and the availability of VC funding may explain startups' IPO valuations and timing. Using data on 513 VC-backed startups that had IPOs on American stock exchanges from 2010 through 2019 (by SEC filing date), they hypothesize and find that more scalable ventures undertake IPOs at higher valuations, and this relationship is positively moderated by the availability of VC funding. Startups that are high in scalability also delay their IPOs for longer, but only when VC funding availability is high. Notably, [Somaya and You \(2024\)](#) view scalability as a property of a firm and its business model, although like [Giustiziero et al. \(2023\)](#), they emphasize a firm's digital resources. A particular contribution of their study is the variety of ways they assess scalability, including text-based measures from IPO prospectuses and pre-IPO company descriptions, and accounting measures.

Our definition of scalability differs from [Somaya and You's \(2024\)](#) given we emphasize its properties as an organizational capability to be developed. We also reiterate that a firm's leaders need to carefully manage *both* technological architecture and organizational architecture *and* its business model to build this capability. This perspective begins to move the conversation to a finer-grained view of what firms need 'to do' to initiate and support the scaling process, although much research is needed in this area. Our perspective also suggests the need for managerial insight from primary data – both qualitative and quantitative – rather than the use of secondary data. To date, however, only [Zhao et al. \(2013\)](#) offer a scale-based measure for scalability. This is a useful starting point, but our first suggestion is that new measures should be developed and tested to understand what internal elements need to be changed and what aspects of digitalization are relevant. Doing so will also allow us to better assess how and when firms coherently manage their organizational and technological architectures, and business model, to achieve some degree of scalability.

This leads us to call for research analyzing the link between scalability and scaling in terms of how and when firms identify and manage the organizational changes needed to scale. The extant literature already hints as to what might be relevant. First, beginning with the most neglected aspect of scalability, [DeSantola and Gulati \(2017\)](#) reason that internal change (i.e., professionalization) is required for a firm to handle greater complexity both externally (in the market) and internally (within the organization). This means a firm's leaders likely need to re-think, for example, the composition and nature of its workforce, including how, where, and when people work. Also pertinent are work processes and a firm's organizational structure. Yet other decisions could involve shifting capital requirements to partners, or leveraging their network of partners, including customers ([Nielsen and Lund, 2018](#)). [Jansen et al.'s \(2023\)](#) explication of the strategies or decisions to be made regarding scaling are also likely to be pertinent in that efforts to build scalability may benefit from considering the scope, unit, mode, dynamics, and value logic associated with a firm's planned scaling process. Therefore, to create a contemporary measure of scalability as a capability, scholars need to identify and test a comprehensive pool of items that are relevant to organizational architecture and its change. This, however, is only one part of assessing scalability and scholars need to take the same approach to identifying similar types of items for technological architecture.

Second, and following from the above, many of the articles in our review situate their definition in the context of technology firms with, for example, cloud-based business models ([Juntunen et al., 2018](#)) or born digitals ([Mihailova, 2023](#); [Monaghan et al., 2020](#)). Also, [Zhang et al. \(2015\)](#) are the first to define scalability specific to digital business models. We fully agree that managing technological architecture is central to scalability, but scholars should seek a better understanding of what firms do to leverage digitization and digitalization ([Gradillas and Thomas, 2023](#)). Also necessary is an understanding of why and when they do so. For example, to what extent do firms virtualize real-world phenomena (i.e., map them onto digital objects), deploy or contextualize such objects in specific institutional or market settings, and operationalize them in specific computing infrastructures (as suggested by [Lyytinen, 2022](#))? How do firms leverage digitalization to extend their value offering and make their offers available anytime and anywhere? Future research might also ask: Is there an optimal configuration (or set of configurations) to consider regarding the portfolio of digitalization decisions and resources for scalability? Our point here is that more indepth research on the digitalization dimension of scalability is necessary to take us beyond simply appreciating its general relevance to this capability. Configuration research could, and even should, include the organizational architecture elements of scalability.

Third, we refer above to 'some degree of scalability' and we suggest there are degrees of scalability to be investigated given the presence or absence of certain organizational elements and/or technological resources will strengthen or weaken a firm's scalability. For instance, a factory is likely to have lower scalability because fixed physical capacity exists and incurs capital expenditures whether it is utilized or not. In contrast, organizations like SuperCell exhibit high scalability (at least, on the digitalization dimension). Its games are fully digital and available through a scale-free platform (AppStore), and transactions are managed by scale-free resources (Apple's payment processing systems). Their freemium model also triggers buyer incentives to purchase add-ons as they improve. These differences are consistent with [Giustiziero et al.'s \(2023, p. 6\)](#) observation that "in practice, firms can vary in the extent to which they are 'digital'...thus the resulting scalability of their resource bundles may vary."

Does this mean that a firm needs to be fully digital to have scalability? The arguments of [Giustiziero et al. \(2023\)](#) suggest not. If we consider firms that are not fully digitalized (e.g., they offer tangible products or components, use person-based customer support, seek physical expansion to new locations), even more significant internal change and business model adaptation may be required to build

and support scalability. That said, firms that are not fully digitalized can still outsource through application programming interfaces (APIs). For instance, payment gateways and APIs allow businesses to program physical delivery, storage, and logistics operations into their business model, and convert these operations to become virtually scale-free. By connecting physical service APIs into a technological architecture, firms can skip partnerships and 1–1 supplier contracts with specific logistics operators. There are also non-digital scalability strategies. For example, franchising helps increase outputs without a corresponding *ex ante* increase in inputs by the franchisor firm (Gulati et al., 2012), and technology licensing can achieve the same. Scholars should therefore consider how and why the three combined dimensions of scalability (technological architecture, organizational architecture, and business model) vary in their impact across different contexts. For example, does scalability differ across born digitals and more traditional (less digitalized) organizations? How, when, and why might it be similar? What are the implications of scalability increasing or decreasing over time? Does it need to be ‘ever present’ given firms may move in and out of the scaling process?

Fourth, we remind scholars that the technological or digitalization dimension of scalability should not be considered separately (as is a common pattern to date). Instead, we need to assess and understand the role and impact of it *together with* a firm’s organizational architecture and its business model. An example of why this is relevant this can be seen with Shopify. This born digital did not start operations with the intent to scale (let alone serve international markets). Although it did so by quickly developing high levels of sophistication in leveraging digital resources, when Shopify expanded to its highest headcount in 2022, the management team faced numerous challenges regarding their human capital, internal processes and systems, and core offer(s). This led to numerous changes including a reduction of the global workforce in 2023. Thus, Shopify’s scalability was determined by more than how well (or much) it leveraged digital resources because complex organizational elements and the business model also required significant attention and action.

Fifth, scalability is but one capability. We therefore ask: Is it sufficient for a firm to have scalability for an effective scaling process? Or might a firm also require strategic flexibility? What is the role of a firm’s strategic posture(s) such as its entrepreneurial orientation or market orientation? What might moderate the influence of scalability on the scaling process? For example, what is the role of a firm’s financial capability or its institutional or industry environment? What is the relationship between scalability and a firm’s absorptive capacity (Cohen and Levinthal, 1990) given the argument that a scaling firm needs to be able to accumulate, communicate, relocate, and connect knowledge (Shepherd and Patzelt, 2022)?

Finally, if scalability (as a capability) is a strategic consideration, we need to consider the role and impact of those driving the organization. For example, what personal characteristics (e.g., cognition, psychographics) and team characteristics (e.g., shared vision) facilitate the development of scalability? Do efforts to build scalability require cognitive congruence between the board, founders, top management team, and employees? How much, and what type of digital competencies does the top management team need to build scalability?

8.4. Opportunities for research on the scale-up phase and scale-up firms

Although authors use a variety of metrics to define scale-up as a type of high growth firm, we recommend moving away from the use of categorical thresholds. Instead, we view scale-up as one of many phases of organizational development and when a firm is in this phase, it is a scale-up. This perspective has a variety of implications for future research.

First, we argue that setting quantitative thresholds to identify a firm in the scale-up phase fails to recognize contextual influences as seen in the Deloitte Fast 500 example discussed earlier (see also Palmié et al., 2023). This leads us to contend that labelling a firm as a ‘scale-up’ by using a definition that simply replaces ‘high growth’ with scaling is misleading and insufficient. We strongly discourage using the OECD (2007) definition to identify firms in the scale-up phase.⁸

Second, if scale-up is a phase of organizational development, we need a better understanding of its nature (characteristics, timing, outcomes) relative to phases that come before and after. For example, to enter the scale-up phase, what degree of scalability is required? What else needs to be in place in terms of, for example, a strategy to exploit network effects (Rayport et al., 2023)? Keeping in mind that a firm might be exploiting a core business while also exploring new ones, can one part of a firm be in a scale-up phase while other parts are in earlier (or later phases)? Rayport et al. (2023) suggest ambidexterity is required in this situation. How can managers build ambidexterity to be in the scale-up phase for one part of the business but not the other? Also pertinent is that a firm might enter the scale-up phase multiple times during their development. Are there differences to being in an earlier vs. later scale-up phase? Linking this back to earlier points, what degree of scalability is needed prior to scale-up, for a firm to start scaling? What happens if scalability drops when the firm is in the scale-up phase?

Third, we consider the outcomes of being in the scale-up phase. When do managers shift from considering growth as their primary target to assessing economies of scale? When do they shift to considering returns of scale? What drives this shift in perspective and

⁸ Our review excludes Coad et al.’s (2024) book that defines scale-ups as a specific type of high growth firm. Although they too view scale-up as stage (i.e., phase) of development involving a range of activities, their empirical definition requires firms in this phase to be high-growth firms based on growth in employment. They also include seven conditions (p. 51): “(1) Scale-ups have a non-negative change in marketing; (2) the age of scale-ups is below the median for the set of HGFs; (3) Scale-ups have a non-negative change in intangible assets; (4) scale-ups have a non-negative growth of inventory; (5) scale-ups are in the digital/ICT sector; (6) for scale-ups, growth of sales is faster than growth of employees; (7) scale-ups have high margins (e.g. operating margins above 30 %).” Although Coad et al. (2024) note that firms might only satisfy 4 or 5 out of 7 conditions to be considered scale-ups, we are concerned that their basic definition relies on employment growth (whereas digital firms can be smaller) and their conditions do not fully consider either economies of scale or returns to scale.

understanding? How does being in the scale-up phase impact a firm's ability to attract capital? How does this differ from when a firm is in an early scale-up phase vs. a later one? Relatedly, given scaling can be preceded by, co-occur, and be followed by 'ordinary' forms of growth (organic, acquisitive), what is the optimal way to combine and balance being in the scale-up phase with acquisitive or organic growth? When can organic growth drive scaling, when will it co-occur, and when is scaling followed by organic growth?

Further to outcomes, future research should ask: When does being in the scale-up phase positively drive performance and when does it risk undermining performance? More generally, why might a scale-up fail? We know that scaling can happen prematurely. Is there a time that is too early for a firm to enter the scale-up phase and if so, what happens? Given Murray and Fisher (2023) suggest that scaling might be controlled or uncontrolled, what are the implications of the latter? In this vein, there is need for research on the negative implications of being a scale-up (also called for by, e.g., Jansen et al., 2023; Tippmann et al., 2023a). This topic is addressed in the final paper of our special issue. Genedy et al. (2024, special issue) examine how employees experience the scale-up phase. Using a sample of 10,908 new venture employees in Sweden, they show that being in the scale-up phase is positively associated with employee burnout, and negatively with job satisfaction. This applies to both digital and non-digital ventures. This leads Genedy et al. (2024, p. 19) to suggest that "scaling might carry the seeds of its own future demise when employees are unsatisfied with their work." They also note that in contrast to other employees, managers experience less burnout and greater job satisfaction during scaling. This contrast has implications for human resource management and well-being. It also suggests that studying only founders and the top management team members of scale-ups is insufficient.

Finally, there are existing calls for comparative scaling research on, for example, younger vs. more mature firms (Jansen et al., 2023; Palmié et al., 2023). But how does the scale-up phase differ across firms based on their level of digitalization (e.g., born digitals versus more traditional and less digitalized organizations)? Furthermore, is the scale-up phase similar across different contexts such as for-profit technology ventures versus social ventures? Does firm age or commercialization strategy shape what happens in the scale-up phase? Are lessons from unicorn firms relevant for start-ups seeking to shift from a growth phase to the scale-up phase?

8.5. Opportunities for research on scaling contexts

Beyond the concepts of scaling, scalability, and scale-up, various articles in our review indicate that the wider external context is influential to firms trying to scale (e.g., Iurkov et al., 2023; Jansen et al., 2023; Rong et al., 2018; Monteiro, 2019; Zeng et al., 2023). Given Tippmann et al.'s (2023a) extensive discussion of research opportunities regarding the international context, we focus here on two types of ecosystems to consider definitional contexts beyond those noted in Tables 2–4 and internationalization.

The first external context is a firm's innovation ecosystem (Thomas and Autio, 2020) and its potential to influence a firm's scaling process. Some interesting research directions include: What is the relationship between an innovation ecosystem's momentum (Autio, 2022) and a firm's scaling momentum, and how is this relationship built? How can firms harness rivalrous and non-rivalrous ecosystem resources for momentum-building as they try to scale? How much of the scaling process involves harnessing proprietary resources, and how much of it is due to harnessing common resources in an innovation ecosystem (e.g., open-source software and hardware, published scientific research)? More broadly, what is the role of industry dynamics and architecture for firms trying to scale? How can industry architectures be manipulated to facilitate scaling?

The second context pertains to entrepreneurial ecosystems (see Autio et al., 2018) and the support organizations in them, for example, accelerators and incubators. In terms of future research, does being in an entrepreneurial ecosystem improve a firm's scalability? Why? How? Is acceleration or incubation effective for firms trying to scale? Is one type of program more effective than the other? Does the timing of participation in an accelerator or incubator program and the specific nature and offers of the program make a difference to the scaling process? Does this differ for, for example, firms that are nascent start-ups versus those that are more established? Furthermore, rather than assume accelerators and incubators are beneficial to scaling, we suggest a need for research on their potential negative effects for scale-ups (i.e., firms in the scale-up phase). For example, is there diminished variance among firms due to the provision of standardized support? Also pertinent is that other actors in this type of ecosystem are potentially relevant. Scholars should consider whether scaling is confined to the boundaries of a firm, or if it extends to building momentum and leverage in the entrepreneurial ecosystem. In a related vein, we ask: Is co-location necessary for firms to benefit from the entrepreneurial ecosystem's knowledge and knowledge spillovers? Beyond other firms, does government intervention (funding, tax credits, policy initiatives) facilitate the scaling process? When do different types of investors help or hinder scaling? What is more beneficial to a scaling firm: access to capital or the process of seeking capital?

8.6. Practitioner and policy implications

The definitions offered here for scaling, scalability, and scale-up also suggest implications for both practice and policy. First, managers should recognize that in the digital age, firm growth dynamics are more multi-faceted and complex than when the typical way to grow outputs was to invest in manufacturing capacity.

Second, scaling, at its core, is an organizational process and managers need to treat it as such. This implies a need for managers to institute complementary changes in not only the firm's technological architecture but its internal, organizational architecture too. Managers should also validate their business model before considering the decision to scale it, and the scaling process requires them to focus on generating returns to scale (not just growing). This calls for managers to develop a deeper understanding of their firm's broader value structure to evaluate scaling opportunities. They should also appreciate that the scaling process does not happen automatically or just because a firm is growing, nor are the terms synonymous. Rather, managers must consciously and proactively plan when to shift gears to enable scaling.

Third and following from the above, the decision to shift gears implies the need to develop the firm's scalability. Doing so means the firm will be ready to commence the scaling process when their value offerings demonstrate a good fit to market needs. Given our definition for scalability, a key task for managers is to eschew siloed thinking with regards to technological and organizational architectures and business model decisions. Instead, they need to develop a holistic view of how changes in these different dimensions of a business operation may synergistically enhance the firm's scalability. Developing scalability also needs to be an intentional act and may require rethinking the emphasis placed on identifying and deploying (near) scale-free resources at the firm level. This is becoming apparent in both manufacturing and service firms—for example, servitization and productization initiatives involving the use of digital, data, and analytics elements has enabled firms to rapidly scale their value offerings. Important too is that building scalability constitutes a managerial challenge that is distinct from, and complementary to, problem-solution validation and product-market fit validation. Firms that fail to address the scalability challenge risk validating market demand only to see others reap the benefits.

Fourth, our notion of scale-up as a phase of organizational development calls for managers to determine the right cadence for their firm. That is, they need to understand when they are still exploring problem-solution fit and product-market fit, and when the time is right to move from, for example, growth to scale-up. As part of this managers need to understand and evaluate external factors such as the rapid diffusion of generative AI that may make moving into the scale-up phase timely and appropriate. This decision will also require consideration of the wider ecosystem within which the firm is embedded, the identification of scaling levers therein, and the identification of synergies with ecosystem partners that can be leveraged to boost the focal firm's scaling process and efforts to develop scalability.

Finally, as seen in the emergence of, for example, the European Innovation Council's ScaleUp 100 initiative or ScaleUp USA (a federal accelerator), policymakers are interested in scaling. They too need to understand the concepts of scaling, scalability, and scale-up, and that scaling is a specific type of growth rather than simply growth per se. Similarly, policymakers must recognize that the dynamics of organizational growth have been transformed, and firms in all phases of development are now leveraging digital technologies. Pertinent here is that using employment growth as a core metric is now less relevant than it used to be. Instead of simply providing subsidies to support conventional investment in production capacity to preserve and create manufacturing jobs, policymakers are therefore advised to understand the implications of digitalization for wealth creation and adjust their policies accordingly. Policymakers should also include institutional support for companies to evaluate their readiness to scale and enhance accessibility to digital infrastructures to promote scaling especially in resource-constrained parts of the economy. They should also offer incentives for companies that mitigate the potential negative effects of scaling on employment, for example, through the AI-induced automation of functions such as customer service centers that were previously delivered manually. Finally, we suggest that regional policy-makers should adopt explicit policies to enhance their entrepreneurial ecosystems to promote experimentation with, and knowledge sharing of, effective scaling practices in the digital age (Autio et al., 2018).

9. Conclusion

In this paper, we have systematically reviewed the distinct concepts of scaling, scalability, and scale-up. We present scaling as an organizational process, scalability as an ordinary organizational capability, and scale-up as a phase of organizational development. Our conceptualizations emphasize that scaling involves both internal change to the organization and leveraging digital resources. Complementing and extending existing scholarly insights, we offer a rich agenda for entrepreneurship research, along with implications for practitioners and policymakers. The papers of this special issue exemplify research consistent with our agenda. We hope that other scholars can build on our insights to advance our understanding of this highly contemporary topic.

CRediT authorship contribution statement

Nicole Coviello: Writing – review & editing, Writing – original draft, Visualization, Project administration, Methodology, Formal analysis, Data curation, Conceptualization. **Erkko Autio:** Writing – review & editing, Conceptualization. **Satish Nambisan:** Writing – review & editing, Visualization, Conceptualization. **Holger Patzelt:** Writing – review & editing, Visualization, Formal Analysis, Conceptualization. **Llewellyn D.W. Thomas:** Writing – review & editing, Visualization, Conceptualization.

Data availability

Data will be made available on request.

Appendix A. Methodological procedures for search, selection, and exclusion

A. General parameters for article search and selection.

1. Peer-reviewed journal articles (published or early access).
2. Empirical AND conceptual articles.
3. Article defines scaling and/or scalability and/or scale-up.

B. Search method and scope.

1. Full search of articles relevant to the three concepts noted above until December 2023.
2. Admittance criteria by keyword search using Web of Science (WoS).
3. Limited to Articles or Early Access Articles.
4. WoS Categories: Business; Management.
5. Initial identification through 'TOPIC' (i.e., title, abstract, and keywords).
6. Search keywords:
 - a. Scaling OR
 - b. Scalability, scaleability OR
 - c. Scale-up, scale up, scaleup AND
 - d. Business, organization, firm OR
 - e. New venture, startup, SME OR
 - f. Business model OR
 - g. Internationalization.
7. A manual search of identified articles to ensure the above noted criterion A3 was met.

C. Exclusion criteria.

1. Review articles or editorials pertaining to scaling or related topics in the above literature.
2. Papers accepted to the JBV Special Issue on Entrepreneurial Scaling.
3. Articles where the concepts of interest appear *only* as keywords or in the abstract.
4. Articles focused on scale in terms of size (e.g., small scale vs. large scale).
5. Articles discussing scaling as a methodological issue (e.g., multi-dimensional scaling).
6. Articles in which the primary focus is not on scaling, scalability, or scale-up (e.g., studies of network effects or entrepreneurial ecosystems) OR the concepts are not part of a core argument.
7. Articles available only online.
8. Articles in the context of (e.g.):
 - a. social ventures, social innovation, or social entrepreneurship
 - b. computer systems or networks
 - c. information technology or information systems; or
 - d. discussions of international 'scale and scope.'
9. Research published in edited books and conference proceedings.
10. Blog posts or reports only available on a website.
11. Policy reports.
12. Case studies (e.g., published as a case study for teaching purposes).
13. Articles not in English.
14. Articles unavailable electronically or by other reasonable means.

References

- Adner, R., Puranam, P., Zhu, F., 2019. What is different about digital strategy? From quantitative to qualitative change. *Strategy Sci.* 4, 253–261. <https://doi.org/10.1287/stsc.2019.0099>.
- Autio, E., 2022. Orchestrating ecosystems: a multi-layered framework. *Innov. Organ. Manag.* 24 (1), 96–109. <https://doi.org/10.1080/14479338.2021.1919120>.
- Autio, E., Nambisan, S., Thomas, L.D.W., Wright, M., 2018. Digital affordances, spatial affordances, and the genesis of entrepreneurial ecosystems. *Strateg. Entrep. J.* 12, 72–95. <https://doi.org/10.1002/sej.1266>.
- Bacq, S., Drover, W., Kim, P.H., 2021. Writing bold, broad, and rigorous review articles in entrepreneurship. *J. Bus. Ventur.* 36 (6), 106147 <https://doi.org/10.1016/j.jbusvent.2021.106147>.
- Belitski, M., Martin, J., Stettler, T., Wales, W., 2023a. Organizational scaling: the role of knowledge spillovers in driving multinational enterprise persistent rapid growth. *J. World Bus.* 58 (5), 101461 <https://doi.org/10.1016/j.jwb.2023.101461>.
- Belitski, M., Stettler, T., Wales, W., Martin, J., 2023b. Speed and scaling: an investigation of accelerated firm growth. *J. Manag. Stud.* 60, 639–687. <https://doi.org/10.1111/joms.12869>.
- Bigdeli, A.Z., Li, F., Shi, X., 2016. Sustainability and scalability of university spinouts: a business model perspective: sustainability and scalability of university spinouts. *R&D Manag.* 46, 504–518. <https://doi.org/10.1111/radm.12167>.
- Birch, D.L., 1981. Who creates jobs? *Public Interest* 65, 3–14.
- Bohan, S., Tippmann, E., Levie, J., Igoe, J., Bowers, B., 2024. What is scaling? *J. Bus. Ventur.* 39, 106355 <https://doi.org/10.1016/j.jbusvent.2023.106355>.
- Braun, V., Clarke, V., 2006. Using thematic analysis in psychology. *Qual. Res. Psychol.* 3, 77–101. <https://doi.org/10.1191/1478088706qp063oa>.
- Bruneel, J., Gaeremynck, A., Weemaes, S., 2022. Outside board members and strategic orientation of new ventures in the startup phase. *Strateg. Entrep. J.* 16 (4), 801–825. <https://doi.org/10.1002/sej.1440>.
- Büge, M., Özcan, P., 2021. Platform scaling, fast and slow. *MIT Sloan Manag. Rev.* 62, 17–23.
- Busch, C., Barkema, H., 2021. From necessity to opportunity: scaling bricolage across resource-constrained environments. *Strateg. Manag. J.* 42 (4), 741–773. <https://doi.org/10.1002/smj.3237>.
- Carucci, R., 2016. Midsize companies shouldn't confuse growth with scaling. *Harv. Bus. Rev.* 94 (4), 2–4. <https://hbr.org/2016/07/midsize-companies-shouldnt-confuse-growth-with-scaling>.

- Cavallo, A., Ghezzi, A., Dell'Era, C., Pellizzoni, E., 2019. Fostering digital entrepreneurship from startup to scaleup: the role of venture capital funds and angel groups. *Technol. Forecast. Soc. Chang.* 145, 24–35. <https://doi.org/10.1016/j.techfore.2019.04.022>.
- Cavallo, A., Cosenz, F., Noto, G., 2023. Business model scaling and growth hacking in digital entrepreneurship. *J. Small Bus. Manag.* <https://doi.org/10.1080/00472778.2023.2195463> (in press).
- Chandler, A.D., 1990. *Scale and Scope: The Dynamics of Industrial Capitalism*. Belknap/Harvard University Press, Cambridge.
- Coad, A., Bornhöll, A., Daunfeldt, S.-O., McKelvie, A., 2024. *Scale-ups and High-growth Firms: Theory, Definitions, and Measurement*. Springer, Singapore.
- Cohen, W.M., Levinthal, D.A., 1990. Absorptive capacity: a new perspective on innovation and learning. *Adm. Sci. Q.* 35, 128–152. <https://doi.org/10.2307/2393553>.
- Coutu, S., 2014. The Scale-up Report on UK Economic Growth. <https://www.scaleupinstitute.org.uk/reports/the-scale-up-report-2014/>.
- Coviello, N., 2015. Re-thinking research on born globals. *J. Int. Bus. Stud.* 46, 17–26.
- Coviello, N., 2019. Is a High-growth Firm the Same as a “Scale-up”? Lazaridis Institute for the Management of Technology Enterprises, Waterloo, Canada.
- Coviello, N., Kano, L., Liesch, P., 2017. Adapting the Uppsala model to a more modern world: macro-context and microfoundations. *J. Int. Bus. Stud.* 48, 1151–1164. <https://www.jstor.org/stable/45149368>.
- Deloitte Fast 500 Technology Awards, 2023. <https://www2.deloitte.com/content/dam/Deloitte/us/Documents/technology-media-telecommunications/us-2023-fast-500-winners-brochure-v1.1.pdf>.
- Denney, S., Southin, T., Wolfe, D.A., 2023. Do winners pick government? How scale-up experience shapes entrepreneurs' assessments of innovation policy mixes. *Sci. Public Policy* 50 (5), 858–870. <https://doi.org/10.1093/scipol/scad030>.
- DeSantola, A., Gulati, R., 2017. Scaling: organizing and growth in entrepreneurial ventures. *Acad. Manag. Ann.* 11, 640–668. <https://doi.org/10.5465/annals.2015.0125>.
- DeSantola, A., Gulati, R., Zhelyazkov, P.I., 2023. External interfaces or internal processes? Market positioning and divergent professionalization paths in young ventures. *Organ. Sci.* 34, 1–23. <https://doi.org/10.1287/orsc.2021.1561>.
- Dushnitsky, G., Matusik, S.F., 2019. A fresh look at patterns and assumptions in the field of entrepreneurship: what can we learn? *Strateg. Entrep. J.* 13, 437–447. <https://doi.org/10.1002/sej.1324>.
- Fayol, H., 1949. *General and Industrial Management*. Sir Isaac Pitman & Sons Ltd., London (translation by Constance Storrs).
- Genedy, M.A., Hellerstedt, K., Naldi, L., Wiklund, J., 2024. Growing pains in scale-ups: how scaling affects new venture employee burnout and job satisfaction. *J. Bus. Ventur.* 39 (2), 106367 <https://doi.org/10.1016/j.jbusvent.2023.106367>.
- Giustiziero, G., Kretschmer, T., Somaya, D., Wu, B., 2023. Hyperspecialization and hyperscaling: a resource-based theory of the digital firm. *Strateg. Manag. J.* 44, 1391–1424. <https://doi.org/10.1002/smj.3365>.
- Gradillas, M., Thomas, L.D.W., 2023. Distinguishing digitization and digitalization: a systematic review and conceptual framework. *J. Prod. Innov. Manag.* <https://doi.org/10.1111/jpim.12690>.
- Gulati, R., DeSantola, A., 2016. Start-ups that last: how to scale your business. *Harvard Bus. Rev.* 94 (3), 54–61.
- Gulati, R., Puranam, P., Tushman, M., 2012. Meta-organization design: rethinking design in interorganizational and community contexts. *Strateg. Manag. J.* 33, 571–586. <https://doi.org/10.1002/smj.1975>.
- Halaburda, H., Oberholzer-Gee, F., 2014. The limits of scale. *Harv. Bus. Rev.* 92 (4), 94–99.
- Hallowell, R., 2001. Scalability: the paradox of human resources in e-commerce. *Int. J. Serv. Ind. Manag.* 12, 34–43. <https://doi.org/10.1108/09564230110694820>.
- Hellmann, T., Kavadias, S., 2016. *ScaleUp UK: Growing Businesses*. Growing our Economy, Barclays.
- Hoffman, R., Yeh, C., 2018. *Blitzscaling: The Lightning-fast Path to Building Massively Valuable Businesses*, First edition. Currency, New York.
- Huang, J., Henfridson, O., Liu, M.J., Newell, S., 2017. Growing on steroids: rapidly scaling the user base of digital ventures through digital innovation. *MIS Q.* 41 (1), 301–314. <https://www.jstor.org/stable/26629649>.
- Iurkov, V., Koval, M., Zakaryan, A., 2023. The role of network community characteristics for firms' rapid business scaling. *Technol. Forecast. Soc. Chang.* 196, 122838 <https://doi.org/10.1016/j.techfore.2023.122838>.
- Jansen, J.J.P., Heavey, C., Mom, T.J.M., Simsek, Z., Zahra, S.A., 2023. Scaling-up: building, leading and sustaining rapid growth over time. *J. Manag. Stud.* <https://doi.org/10.1111/joms.12910>.
- Johnson, G.A., 1982. Organizational structure and scalar stress. In: *Theory and Explanation in Archaeology*, pp. 389–421.
- Jones, M.V., Coviello, N., Tang, Y.K., 2011. International entrepreneurship research (1989–2009): a domain ontology and thematic analysis. *J. Bus. Ventur.* 26, 632–659. <https://doi.org/10.1016/j.jbusvent.2011.04.001>.
- Juntunen, M., Ahokangas, P., Nguyen, H., 2018. Business model scalability in the cloud business context. *J. Bus. Models* 6, 19–39. <https://doi.org/10.5278/ojs.jbm.v6i1.2396>.
- Kohler, T., 2018. How to scale crowdsourcing platforms. *Calif. Manag. Rev.* 60 (2), 98–121. <https://doi.org/10.1177/0008125617738261>.
- Kuratko, D.F., Holt, H.L., Neubert, E., 2020. Blitzscaling: the good, the bad, and the ugly. *Bus. Horiz.* 63, 109–119. <https://doi.org/10.1016/j.bushor.2019.10.002>.
- Lange, F., Tomini, N., Brinkmann, F., Kanbach, D.K., Kraus, S., 2023. Demystifying massive and rapid business scaling – an explorative study on driving factors in digital start-ups. *Technol. Forecast. Soc. Chang.* 196, 122841 <https://doi.org/10.1016/j.techfore.2023.122841>.
- Lee, C., 2013. Welcome to the unicorn club: learning from billion-dollar startups. In: TechCrunch, 2 November. <https://techcrunch.com/2013/11/02/welcome-to-the-unicorn-club/>.
- LePine, J.A., Wilcox-King, A., 2010. Developing novel theoretical insight from reviews of existing theory and research. *Acad. Manag. Rev.* 35, 506–509. <https://doi.org/10.5465/amr.35.4.zok506>.
- Lyttinen, K., 2022. Innovation logics in the digital era: a systemic review of the emerging digital innovation regime. *Innovation* 24 (1), 13–34. <https://doi.org/10.1080/14479338.2021.1938579>.
- Macpherson, A., Holt, R., 2007. Knowledge, learning and small firm growth: a systematic review of the evidence. *Res. Policy* 36, 172–192. <https://doi.org/10.1016/j.respol.2006.10.001>.
- Maresch, D., Leo, H., Walsh, S.T., 2023. Hotpurs in, sober bores out: a call and an agenda for entrepreneurship and innovation policies that foster rapidly scaling ventures. *Technol. Forecast. Soc. Chang.* 196, 122846 <https://doi.org/10.1016/j.techfore.2023.122846>.
- McKelvie, A., Wiklund, J., 2010. Advancing firm growth research: a focus on growth mode instead of growth rate. *Entrep. Theory Pract.* 34 (2), 261–288. <https://doi.org/10.1111/j.1540-6520.2010.00375.x>.
- Mihailova, I., 2023. Business model adaptation for realized international scaling of born-digitals. *J. World Bus.* 58, 101418 <https://doi.org/10.1016/j.jwb.2022.101418>.
- Mithani, M.A., 2023. Scaling digital and non-digital business models in foreign markets: the case of financial advice industry in the United States. *J. World Bus.* 58, 101457 <https://doi.org/10.1016/j.jwb.2023.101457>.
- Monaghan, S., Tippmann, E., Coviello, N., 2020. Born digitals: thoughts on their internationalization and a research agenda. *J. Int. Bus. Stud.* 51, 11–22. <https://doi.org/10.1057/s41267-019-00290-0>.
- Monteiro, G.F.A., 2019. High-growth firms and scale-ups: a review and research agenda. *RAUSP Manag. J.* 54 (1), 96–111. <https://doi.org/10.1108/RAUSP-03-2018-0004>.
- Murray, A., Fisher, G., 2023. When more is less: explaining the curse of too much capital for early-stage ventures. *Organ. Sci.* 34 (1), 246–282. <https://doi.org/10.1287/orsc.2021.1568>.
- Nair, S., Blomquist, T., 2019. Failure prevention and management in business incubation: practices towards a scalable business model. *Tech. Anal. Strat. Manag.* 31 (3), 266–278. <https://doi.org/10.1080/09537325.2018.1495325>.
- Nielsen, C., Lund, M., 2018. Building scalable business models. *MIT Sloan Manag. Rev.* 59 (2), 65–69.
- OECD, 2007. Eurostat-OECD Manual on Business Demography Statistics. OECD, Paris, pp. 1–102. Retrieved from. <https://ec.europa.eu/eurostat/documents/3859598/5901585/KS-RA-07-010-EN.PDF.pdf>.

- Ott, T.E., Eisenhardt, K.M., 2020. Decision weaving: forming novel, complex strategy in entrepreneurial settings. *Strateg. Manag. J.* 41 (12), 2275–2314. <https://doi.org/10.1002/smj.3189>.
- Palmié, M., Parida, V., Mader, A., Wincent, J., 2023. Clarifying the scaling concept: a review, definition, and measure of scaling performance and an elaborate agenda for future research. *J. Bus. Res.* 158, 113630 <https://doi.org/10.1016/j.jbusres.2022.113630>.
- Piaskowska, D., Tippmann, E., Monaghan, S., 2021. Scale-up modes: profiling activity configurations in scaling strategies. *Long Range Plan.* 54, 102101 <https://doi.org/10.1016/j.lrp.2021.102101>.
- Picken, J.C., 2017. From startup to scalable enterprise: laying the foundation. *Bus. Horiz.* 60, 587–595. <https://doi.org/10.1016/j.bushor.2017.05.002>.
- Pisoni, A., Ciulli, F., Michelini, L., 2023. Digital international new ventures targeting developing countries: the role of networks during the start-up process. *Tech. Anal. Strat. Manag.* 1–15 <https://doi.org/10.1080/09537325.2023.2214820>.
- Quas, A., Mason, C., Compañó, R., Testa, G., Gavigan, J., 2022. The scale-up finance gap in the EU: causes, consequences, and policy solutions. *Eur. Manag. J.* 40, 645–652. <https://doi.org/10.1016/j.emj.2022.08.003>.
- Ramos, P.H., Pedrosa, M.C., 2023. Brazilian agtech scalability: proposal and assessment of a local multidimensional model. *Eur. J. Innov. Manag.* <https://doi.org/10.1108/EJIM-09-2022-0539> (in press).
- Rawhouser, H., Webb, J.W., Rodrigues, J., Waldron, T.L., Kumaraswamy, A., Amankwah-Amoah, J., Grady, A., 2022. Scaling, blockchain technology, and entrepreneurial opportunities in developing countries. *J. Bus. Ventur. Insights* 18, e00325. <https://doi.org/10.1016/j.jbvi.2022.e00325>.
- Rayport, J.F., Sola, D., Kupp, M., 2023. The overlooked key to a successful scale-up. *Harv. Bus. Rev.* 101 (1–2), 55–65.
- Reuber, A.R., Tippmann, E., Monaghan, S., 2021. Global scaling as a logic of multinationalization. *J. Int. Bus. Stud.* 52, 1031–1046. <https://doi.org/10.1057/s41267-021-00417-2>.
- Rong, K., Patton, D., Chen, W., 2018. Business models dynamics and business ecosystems in the emerging 3D printing industry. *Technol. Forecast. Soc. Chang.* 134, 234–245. <https://doi.org/10.1016/j.techfore.2018.06.015>.
- Rong, K., Li, B., Peng, W., Zhou, D., Shi, X., 2021. Sharing economy platforms: creating shared value at a business ecosystem level. *Technol. Forecast. Soc. Chang.* 169, 120804 <https://doi.org/10.1016/j.techfore.2021.120804>.
- Sanasi, S., 2023. Entrepreneurial experimentation in business model dynamics: current understanding and future opportunities. *Int. Entrep. Manag. J.* 19 (2), 805–836. <https://doi.org/10.1007/s11365-023-00836-7>.
- Sanasi, S., Ghezzi, A., Cavallo, A., 2023. What happens after market validation? Experimentation for scaling in technology-based startups. *Technol. Forecast. Soc. Chang.* 196, 122839 <https://doi.org/10.1016/j.techfore.2023.122839>.
- Schou, P.K., 2023. Coming apart while scaling up: adoption of logics and the fragmentation of organizational identity in science-based ventures. *J. Manag. Stud.* 60, 688–721. <https://doi.org/10.1111/joms.12908>.
- Shepherd, D.A., Patzelt, H., 2022. A call for research on the scaling of organizations and the scaling of social impact. *Entrep. Theory Pract.* 46, 255–268. <https://doi.org/10.1177/1042258720950599>.
- Shepherd, D.A., Williams, T.A., 2023. Different response paths to organizational resilience. *Small Bus. Econ.* 61 (1), 23–58. <https://doi.org/10.1007/s11187-022-00689-4>.
- Sila, I., 2013. Factors affecting the adoption of B2B e-commerce technologies. *Electron. Commer. Res.* 13, 199–236. <https://doi.org/10.1007/s10660-013-9110-7>.
- Sjödin, D., Parida, V., Palmié, M., Wincent, J., 2021. How AI capabilities enable business model innovation: scaling AI through co-evolutionary processes and feedback loops. *J. Bus. Res.* 134, 574–587. <https://doi.org/10.1016/j.jbusres.2021.05.009>.
- Smith, A., 1976 [1776]. *An Inquiry Into the Nature and Causes of the Wealth of Nations*, vol. 2. Clarendon Press, Oxford.
- Snihur, Y., Clarysse, B., 2022. Sowing the seeds of failure: organizational identity dynamics in new venture pivoting. *J. Bus. Ventur.* 37 (1), 106164 <https://doi.org/10.1016/j.jbusvent.2021.106164>.
- Somaya, D., You, J., 2024. Scalability, venture capital availability, and unicorns: evidence from the valuation and timing of IPOs. *J. Bus. Ventur.* 39, 106345 <https://doi.org/10.1016/j.jbusvent.2023.106345>.
- Stampf, G., Prögl, R., Osterloh, V., 2013. An explorative model of business model scalability. *Int. J. Prod. Dev.* 18, 226. <https://doi.org/10.1504/IJPD.2013.055014>.
- Strengers, J., Mutsaers, L., van Rossum, L., Graamans, E., 2022. The organizational culture of scale-ups and performance. *J. Organ. Chang. Manag.* 35 (8), 115–130. <https://doi.org/10.1108/JOCM-09-2021-0268>.
- Sullivan, T., 2016. Blizscaling. *Harv. Bus. Rev.* 94 (4), 44–50.
- Sutton, R.I., Rao, H., Rao, H., 2016. *Scaling up excellence: getting to more without settling for less*. Random House.
- Tatarinov, K., Ambos, T.C., Tschang, F.T., 2023. Scaling digital solutions for wicked problems: ecosystem versatility. *J. Int. Bus. Stud.* 54 (4), 631–656. <https://doi.org/10.1057/s41267-022-00526-6>.
- Teece, D.J., 2014. The foundations of enterprise performance: dynamic and ordinary capabilities in an (economic) theory of firms. *Acad. Manag. Perspect.* 28, 328–352. <https://doi.org/10.5465/amp.2013.0116>.
- Thomas, L.D.W., Autio, E., 2020. Innovation ecosystems in management: an organizing typology. In: Hitt, M.A. (Ed.), *Oxford Research Encyclopedia of Business and Management*. Oxford University Press, Oxford, UK. <https://doi.org/10.1093/acrefore/9780190224851>.
- Thorpe, R., Holt, R., Macpherson, A., Pittaway, L., 2005. Using knowledge within small and medium-sized firms: a systematic review of the evidence. *Int. J. Manag. Rev.* 7, 257–281. <https://doi.org/10.1111/j.1468-2370.2005.00116.x>.
- Tippmann, E., Ambos, T.C., Del Giudice, M., Monaghan, S., Ringov, D., 2023a. Scale-ups and scaling in an international business context. *J. World Bus.* 58, 101397 <https://doi.org/10.1016/j.jwb.2022.101397>.
- Tippmann, E., Monaghan, S., Reuber, R.A., 2023b. Navigating the paradox of global scaling. *Glob. Strateg. J.* <https://doi.org/10.1002/gsj.1435> gsj.1435.
- Tranfield, D., Denyer, D., Smart, P., 2003. Towards a methodology for developing evidence-informed management knowledge by means of systematic review. *Br. J. Manag.* 14, 207–222. <https://doi.org/10.1111/1467-8551.00375>.
- Van de Ven, A.H., Poole, M.S., 1995. Explaining development and change in organizations. *Acad. Manag. Rev.* 20 (3), 510–540. <https://doi.org/10.5465/amr.1995.9508080329>.
- Van Lancker, E., Knockaert, M., Collewaert, V., Breugst, N., 2023. Preparing for scaling: a study on founder role evolution. *J. Bus. Ventur.* 38, 106315 <https://doi.org/10.1016/j.jbusvent.2023.106315>.
- Varga, S., Cholakova, M., Jansen, J.J.P., Mom, T.J.M., Kok, G.J.M., 2023. From platform growth to platform scaling: the role of decision rules and network effects over time. *J. Bus. Ventur.* 38, 106346 <https://doi.org/10.1016/j.jbusvent.2023.106346>.
- Weiss, T., Perkmann, M., Phillips, N., 2022. Scaling technology ventures in Africa: new opportunities for research. *Innovation* 24 (4), 552–567. <https://doi.org/10.1080/14479338.2021.1999249>.
- Zeng, J., Yang, Y., Lee, S.H., 2023. Resource orchestration and scaling-up of platform-based entrepreneurial firms: the logic of dialectic tuning. *J. Manag. Stud.* 60 (3), 605–638. <https://doi.org/10.1111/joms.12854>.
- Zhang, J.J., Lichtenstein, Y., Gander, J., 2015. Designing scalable digital business models. In: *Business Models and Modelling, Advances in Strategic Management*. Emerald Group Publishing Limited, pp. 241–277. <https://doi.org/10.1108/S0742-332220150000033006>.
- Zhao, Y.L., Di Benedetto, C.A., 2013. Designing service quality to survive: empirical evidence from Chinese new ventures. *J. Bus. Res.* 66 (8), 1098–1107. <https://doi.org/10.1016/j.jbusres.2012.03.006>.
- Zhao, Y.L., Song, M., Storm, G.L., 2013. Founding team capabilities and new venture performance: the mediating role of strategic positional advantages. *Entrep. Theory Pract.* 37, 789–814. <https://doi.org/10.1111/j.1540-6520.2012.00513.x>.
- Zhou, Z., Verbarg, R.M., 2023. The impact of product features on market orientation in technology-based new ventures. *J. Bus. Res.* 168, 114230 <https://doi.org/10.1016/j.jbusres.2023.114230>.