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Article

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Agile co-creation and digital entrepreneurship Nexus: A systematic literature review and future research agenda

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ABSTRACT

While existing literature reviews and agenda-setting articles in digital entrepreneurship (DE) offers valuable insights, they fall short of providing a holistic understanding of the nexus between agile co-creation and DE. To address this gap, the current study conducts a systematic literature review (SLR) considering three largest academic databases: Scopus, Web of Science and Google Scholar, and includes 117 research articles for content analysis and synthesis. Based on the findings, the study proposes an integrated framework that conceptualises the agile co-creation –DE nexus through three core thematic dimensions: (i) primary motivations; (ii) principal challenges and critical success factors; and (iii) anticipated outcomes. It further introduces an agile co-creation typology that demarcates four modes: opportunity discovery, rapid learning, strategic agility, and incremental innovation, reflecting how agile co-creation evolve across varying levels of uncertainty and organisational adaptiveness. For future research, the SLR highlights the need for a multi-level analytical approach that captures the interactions among individual entrepreneurial behaviours (micro), institutional and social dynamics (*meso*), and broader digital and regulatory environments (macro). Given that research on the agile co-creation and DE nexus remains in its formative stage, this review and agenda contribute to advancing theoretical development in the field, while also providing practical guidance for entrepreneurs and policymakers to leverage agile co-creation in DE contexts.

1. Introduction and scope

The digital economy, which is primarily shaped by digital technologies and the internet, owes its existence in large part to entrepreneurial actions (Autio et al., 2018; Felicetti et al., 2024; Kraus et al., 2023; Nambisan, 2017). The Big 5 Tech, also known as FAAMG (Facebook, Apple, Amazon, Microsoft, and Google), which started their journey as digital startups, are now among the world's corporate powerhouses. In fact, the digital economy is widely recognised as one of the most transformative economic developments since the Industrial Revolution, and digital entrepreneurship (DE) is the fundamental precursor to this revolution (Amit & Han, 2017; Zaheer et al., 2019). In general, DE is the process of entrepreneurial action that leverages innovative products and services using digital technologies (Kraus et al., 2019; Paul et al., 2023; Sahut et al., 2021).

In the near past, the European Union introduced its first financial instrument, the Digital Europe Programme, recognising digital technology as a changing force that could support joint efforts in facing societal challenges presented by crises such as the COVID-19 pandemic.

To support businesses, citizens, and public administration in leveraging digital technologies, the Digital Europe Programme has provided more than €8.1 billion in funding (European Commission, 2021). One of the lessons learned from the experiences gained in such critical times (i.e. during the lockdown period of the pandemic) is that organisations with higher levels of agility respond better and faster than less agile organisations (Breier et al., 2021; Ebersberger & Kuckertz, 2021). Supporting that in academia, the field of DE has grown quickly in the last decade in response to rapid technological developments, and there has been an exponential growth in the number of articles published on the nexus of agile co-creation and DE (Ghezzi & Cavallo, 2020; Kohtamäki et al., 2020; Sjödin et al., 2020; Thomson et al., 2023).

Agile co-creation is defined as a collaborative approach that creates customer value through active participation among multiple actors (Ghezzi & Cavallo, 2020; Sjödin et al., 2020). In particular, this approach involves applying previous knowledge while continuing to learn from interactions to deliver high-quality products/services under budget constraints and in short timeframes (Cocchi et al., 2023; Jovanovic et al., 2022). In so doing, agile co-creation encompasses more

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flexibility and leanness in close collaboration with relevant external stakeholders, which are increasingly important in the DE context (Kohtamäki et al., 2020; Sjödin et al., 2020). Unlike agile management, which primarily addresses the internal organisation of teams and processes, agile co-creation extends these principles to external stakeholder collaboration in joint value creation (Ghezzi & Cavallo, 2020; Sjödin et al., 2020). Nonetheless, inquiry into the nexus of agile co-creation and DE has spanned diverse fields, including entrepreneurship, information systems, strategic management, and innovation management (Cheng et al., 2023; Ciampi et al., 2022; Felicetti et al., 2024). While each of these respective disciplines has provided valuable insights for understanding value creation aspects in the DE context, this body of research, which is largely fragmented within each domain, has produced contradictory findings (Dana et al., 2024; Di Vaio et al., 2021). In turn, such a lack of shared understanding among scholars could be a significant handicap in developing a cumulative, conceptually integrated body of research that builds systematically on prior evidence and theory and exposes unanswered questions about agile co-creation in the DE context (Cocchi et al., 2023; Paluch et al., 2020).

Previous reviews on DE contexts mostly focused on understanding how the field has developed, how it is advancing, and what the future opportunities are for research as a whole (Kraus et al., 2019; Paul et al., 2023; Steininger, 2019; Zaheer et al., 2019). Some authors have also focused on particular aspects of DE, such as DE in a sharing economy (Fernandes et al., 2022), lean startup approaches in business model innovation in DE (Silva et al., 2020), the nexus of entrepreneurship education and DE (Rippa & Secundo, 2019), and DE and ecosystems (Bejjani et al., 2023). Whereas these reviews primarily emphasise internal venture processes of validated learning through iterative MVP testing, the nexus between agile co-creation and DE extends this logic outward by emphasising collaborative value creation with external stakeholders and digitally enabled ecosystems. In turn, extant literature reviews and agenda-setting articles leave a gap for a holistic understanding of the nexus between agile co-creation and DE. Hence, the present study provides a comprehensive, interdisciplinary, up-to-date review and agenda that complements rather than competes with current reviews in DE research.

To achieve its goal, the study adopts a systematic literature review (Tranfield et al., 2003) and poses the following research question: *What are the critical insights into the nexus of digital entrepreneurship and agile co-creation, and what is the future of this nexus?* By including multidisciplinary and interdisciplinary literature up to December 2024, the study aims to enhance the knowledge base and provides evidence-based suggestions to practitioners such as entrepreneurs, established company executives, accelerator or incubator managers, and policymakers.

By addressing the above research question, this study makes two significant contributions. First, it provides a comprehensive descriptive overview of the existing research at the intersection of agile co-creation and DE. Second, it proposes an integrated framework that delineates the primary motivations, principal challenges, critical success factors, and anticipated outcomes associated with the agile co-creation–DE nexus. Building on this framework, the study introduces an agile co-creation typology that identifies four distinctive modes, i.e. opportunity discovery, rapid learning, strategic agility, and incremental innovation, which capture how agile co-creation evolve across varying levels of uncertainty and organisational adaptiveness. This typology advances theoretical understanding by linking micro-level logics of effectuation (Sarvasathy, 2001) and shared leadership (Pearce & Conger, 2002) with the macro-level processes of dynamic capability development (Teece, 2018; Teece et al., 1997). For future studies, the study highlights the need for a multi-level analytical approach that considers the interplay among individual entrepreneurial actions (micro-level), institutional and social dynamics (meso-level), and broader digital environmental conditions and regulatory frameworks (macro-level). Future studies may also benefit from multilevel theorising, such as integrating micro-level theories with meso-or macro-level perspectives, anchored in clearly defined

boundary conditions. Moreover, the adoption of longitudinal research designs, as opposed to cross-sectional approaches, is recommended to capture the evolving and dynamic nature of this nexus over time.

2. Definitions

This study is grounded in two key concepts: DE and agile co-creation. In this section, we provide definitions of both terms, primarily distilled from insights gained through our literature review. These definitions serve as the conceptual foundation for the subsequent analysis and framework development.

DE refers to the creation of new ventures and/or the transformation of existing businesses by leveraging digital technologies such as artificial intelligence, machine learning, digital artefacts, infrastructure, platforms, 3D technology, blockchain technology, cloud computing, big data analytics, virtual reality, and IoTs (Davidson & Vaast, 2010; Hull et al., 2007; Kraus et al., 2019; Nambisan, 2017; Paul et al., 2023; Zaheer et al., 2019). It encompasses a wide range of activities in which digital tools, artefacts, and infrastructures enable innovation, growth, and value creation across commercial, social, governmental, and corporate domains (Nambisan et al., 2017; Sussan & Acs, 2017; von Briel et al., 2018). Rather than focusing solely on digital actors, DE highlights that the *entrepreneurial activities* themselves, for example, platform-based services such as SaaS (software-as-a-service), DaaS (data-as-a-service) and e-commerce, which are digitally mediated (Kraus et al., 2019; Sahut et al., 2021; Zaheer et al., 2019). Despite its growing prominence, DE remains conceptually diverse. Scholars alternately describe it as a “subcategory of entrepreneurship” (Hull et al., 2007, p. 293) or as an “augmented entrepreneurship” linked to digital self-employment and nascent ventures (Sahut et al., 2021, p. 1162). Nevertheless, there is an emerging consensus that the pervasiveness of digital technologies has reshaped entrepreneurial logics, requiring new understandings of how digital resources, ecosystems, and capabilities drive innovation and competitiveness (Autio et al., 2018; Berglund et al., 2020; Felicetti et al., 2024; Sahut et al., 2021).

Agile co-creation is a stakeholder-centric approach to collaborative value creation that integrates agile principles with the active engagement of multi-level stakeholders to jointly develop innovative solutions (de Souza et al., 2020; Ghezzi & Cavallo, 2020; Sjödin et al., 2020). The underlying goal of agile co-creation is to create and deliver a high-quality, innovative product or service under budget constraints and short time frames (Jovanovic et al., 2022; Sjödin et al., 2020; Thornton, 2024). It emphasises two core principles: (i) risk mitigation through iterative cycles and (ii) direct co-creative communication during development (Ghezzi & Cavallo, 2020; Sjödin et al., 2020). In contrast to traditional value creation approaches such as linear NPD or the stage-gate models (Bohn & Kundisch, 2020; Jovanovic et al., 2022; Thomson et al., 2023), which rely on extensive upfront planning to avoid downstream inefficiencies, agile co-creation offers a better fit for dynamic, digital, and innovation-driven environments, where such rigidity often fails (Cocchi et al., 2023; Ghezzi, 2019, 2020; Paluch et al., 2020). Consequently, scholars increasingly advocate agile co-creation as a paradigm shift toward more adaptive, iterative, and collaborative innovation approaches in DE contexts (Ghezzi & Cavallo, 2020; Sjödin et al., 2020).

To further clarify the conceptual boundaries of agile co-creation, it is useful to delineate its distinction from adjacent approaches that similarly emphasise adaptability, stakeholder engagement, and iterative development. While agile co-creation integrates collaborative value creation with agile principles, related frameworks such as agile management (de Souza et al., 2020; Paluch et al., 2020), lean startup (Ghezzi & Cavallo, 2020; Silva et al., 2020), and open innovation (Chesbrough & Appleyard, 2007; Kim & Park, 2024) provide distinct yet complementary perspectives on organisational flexibility, innovation processes, and knowledge integration (Kohtamäki et al., 2020; Sjödin et al., 2020). Table 1 contrasts these concepts to delineate their theoretical

Table 1
Agile co-creation and related concepts.

Key concept	Definition	References
Agile co-creation	Agile co-creation refers to a collaborative approach where organisations and multi-level stakeholders jointly and iteratively develop solutions using agile principles such as flexibility, rapid feedback, and incremental delivery. It emphasises continuous interaction and value co-creation through short development cycles.	Kohtamäki et al., 2020; Sjödin et al., 2020
Agile management	Agile management is a dynamic and adaptive management approach that applies principles, such as iterative planning, cross-functional collaboration, and responsiveness to change among organisational processes. It promotes decentralised decision-making and continuous improvement to enhance adaptability and customer value.	de Souza et al., 2020; Paluch et al., 2020
Lean startup	The lean startup method focuses on developing new businesses and products through iterative experimentation, validated learning, and build-measure-learn feedback loops. It aims to reduce waste and uncertainty in innovation by testing hypotheses early and adapting based on customer feedback.	Ghezzi & Cavallo, 2020; Silva et al., 2020
Open innovation	Open innovation describes a model where organisations use both internal and external ideas, technologies, and pathways to advance their innovation processes. It involves purposeful inflows and outflows of knowledge to accelerate innovation and expand markets.	Chesbrough & Appleyard, 2007; Kim & Park, 2024

underpinnings, focal mechanisms, and contributions to contemporary innovation and management research.

3. Methodology

In this study, a systematic literature review (SLR) approach is followed. SLR is a reproducible, scientific, and transparent research method used for a rigorous review of research results presented in the literature (Tranfield et al., 2003). To conduct a rigorous and transparent SLR, the current study follows a three-phase approach.

First, the SLR begins with the identification of keywords and search strings. The search strings of keywords are developed by referring to three previous literature reviews. Particularly, the search strings for agile co-creation were drawn from the previous review study of Silva et al. (2020) that provides a complete list of agile methodologies. In addition, search terms related to DE were derived from two previous literature reviews on DE, i.e. Kraus et al. (2019) and Zaheer et al. (2019). The keywords used as search strings are shown in Table 2.

The study aimed to analyse and understand the existing scientific work intersecting agile co-creation and DE. As depicted in Fig. 1, initially, the study searched Scopus for titles, abstracts, and keywords using the selected keywords. The search yielded 829 results. The irrelevant results were excluded by following inclusion and exclusion criteria (see Table 3). This process led to the exclusion of 612 documents, leaving 217 articles for further investigation.

A further 129 articles were excluded during screening because they only referred to agile methodologies or DE without establishing a theoretical connection, or were practitioner-oriented rather than academic contributions. This process left 88 articles from Scopus for final review. To enhance coverage and reduce database bias, the same procedure was applied in Web of Science (WoS) and Google Scholar. While Scopus and WoS provide curated and reproducible indexing, they have known disciplinary blind spots. Google Scholar was therefore used as a complementary source to capture any niche journals not fully indexed elsewhere (Haddaway et al., 2015). To ensure rigor, all records were duplicated and screened to saturation, and reference checks of the 88 Scopus articles were performed. This yielded 83 additional articles, of

Table 2
Keywords in the SLR.

Field	Keywords
Agile co-creation	((“Agile development”) OR (“Agile method”) OR (“Agile tech”) OR (“Agile management”) OR (“Agile tool”) OR (Agile co*) OR (“Customer development”) OR (“Lean startup”) OR (“Lean startup* approach”))
Digital entrepreneurship	((“Digital entrepreneur”) OR (“Digital entrepreneur* ecosystem”) OR (“Digital platform”) OR (“Digital start”) OR (“Digital platform* ecosystem”) OR (“Digital entrepreneur* firm”) OR (“Digital artifact”) OR (“Digital infrastructure”) OR (“iDigital tech”) OR (“Digital tech* firm”))

which 41 were duplicates. Abstract screening of the remaining 42 led to the inclusion of 29 and exclusion of 13 based on the inclusion and exclusion criteria mentioned above. Reference checks of these 29 articles did not yield further additions, resulting in 117 articles for final content analysis and synthesis.

Next, we systematically examined how the literature connects agile co-creation and DE. Both concepts share roots in *innovation* and *dynamic capabilities*, emphasising rapid adaption to uncertainty, iterative experimentation, and stakeholder engagement in value creation. Agile co-creation provides the process logic, enabling entrepreneurs to iteratively design, test, and refine offerings with customers and partners. DE, in turn, extends this by leveraging digital technologies to scale, reconfigure resources, and exploit ecosystem opportunities. Together, they form a mutually reinforcing nexus i.e. agile co-creation enhances entrepreneurial agility and market responsiveness, while DE provides the technological and ecosystem context in which agile co-creation practices can generate scalable value. This theoretical complementarity guided our coding and synthesis, leading to the development of an integrated framework, agile co-creation typology, and the identification of future research opportunities to advance the agile co-creation–DE nexus (Tranfield et al., 2003). We used NVivo, MS Excell, and R for data analysis and visualisation. To ensure methodological rigor, a structured inductive-deductive coding protocol was followed. The first author conducted the primary coding, subsequently reviewed with the co-author and two entrepreneurship scholars through a peer debriefing process, which enhanced interpretive consistency and reduced bias. Thematic saturation was reached when no new themes appeared, indicating analytical completeness. The findings are presented and described in the following chapter.

4. Descriptive analysis

4.1. Publications per year, research methods, and journal outlets

The SLR helps map agile co-creation and DE nexus research by synthesising the literature and providing a common understanding. Notably, the research on DE and agile co-creation had gained momentum since 2017 when two seminal studies, Nambisan (2017) and Nambisan et al. (2017), were published in two reputed journals, *Entrepreneurship Theory and Practice* in entrepreneurship research domain, and *MIS Quarterly: Management Information Systems* in IS research domain. Also, in 2017, two other impactful conceptual studies, i.e. Amit and Han (2017) in *Strategic Entrepreneurship Journal* and Sussan and Acs (2017) in *Small Business Economics*, shed further light on investigating value co-creation with agility in the DE context. Amit and Han (2017) proposed a conceptual framework highlighting the importance of adopting a *system-based value co-creation perspective* for designing and organising firms’ resource configuration. Sussan and Acs (2017) highlighted value co-creation from the *macro-level perspective* and proposed a conceptual framework of *multi-sided digital platforms* to better understand the digital entrepreneurial ecosystem. Since then, scholars have

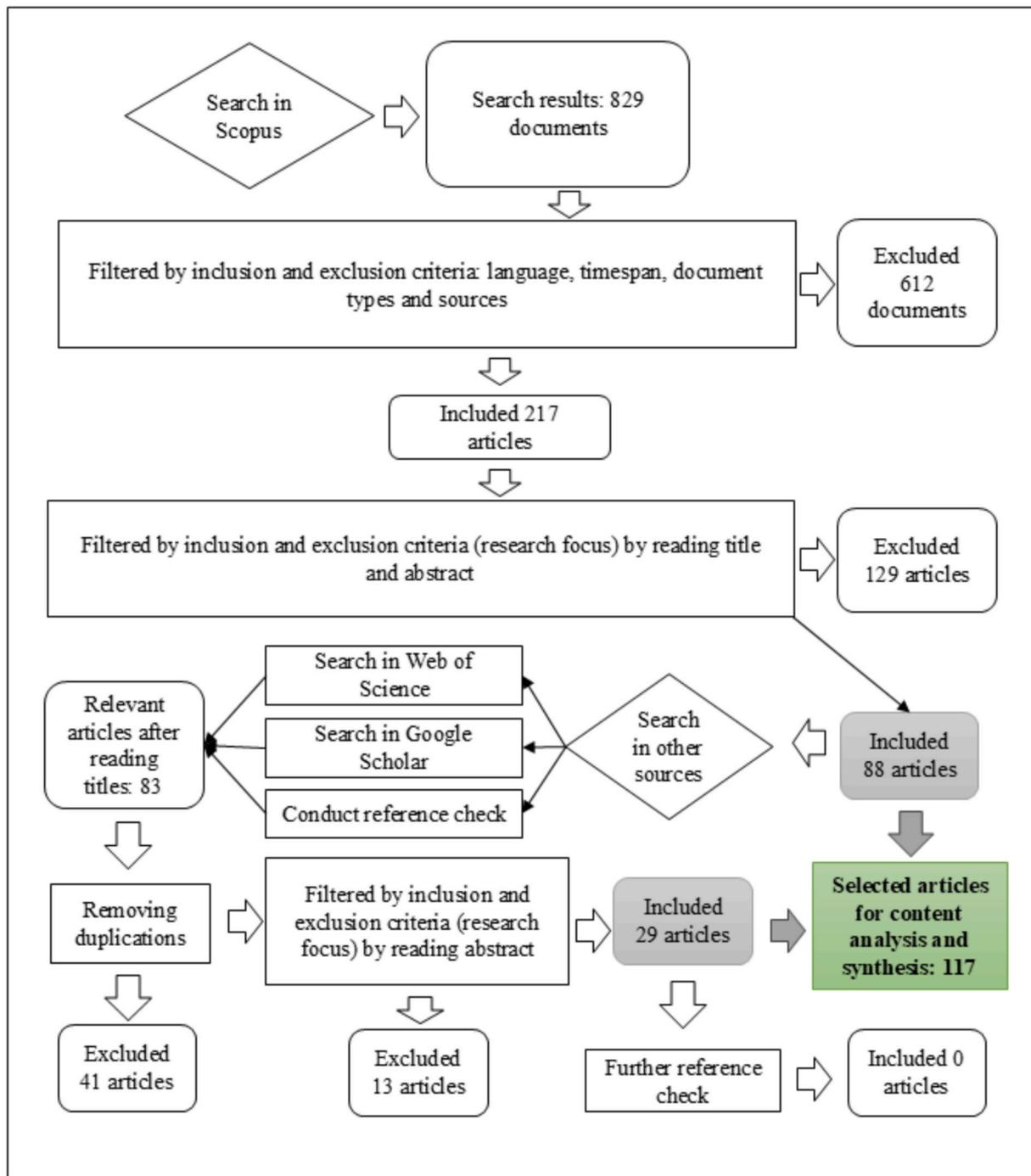


Fig. 1. SLR process and protocols.

been increasingly showing their interest in understanding the nexus between agile co-creation and DE. Evidently, most of the existing articles on agile co-creation and DE nexus research were published from 2021 to 2024 (73.5 % of the corpus, see Fig. 2).

Moreover, as regards the research methods, the current SLR finds that the research is led by *qualitative studies* as 43 % (50 articles of the corpus) of the articles adopted either single case or multiple cases for their investigation and collected qualitative data through interviews, observations, surveys, focus groups, as well as from archival records such as company reports, newspaper articles, press releases, media interviews, social media posts, emails, diaries, and internet pages. This can be further considered as evidence that the *topic's emergent nature* as a case study method is frequently used to draw a first exploratory light in

the early stages of understanding any novel phenomenon and constructing and developing theory (Eisenhardt, 1989; Jaccard & Jacoby, 2020; Yin, 2018). The frequency of other research methods used in the reviewed studies, including quantitative, mixed, conceptual, literature review, Delphi, and action research, is represented in Fig. 3.

As mentioned before, the current SLR investigates agile co-creation and DE nexus across multiple disciplines, including business, management, economics, and decision sciences, using multiple databases (i.e. Scopus, Web of Science and Google Scholar). The findings confirm *the multidisciplinary nature* of this research area, with contributions spanning innovation management, strategic management, entrepreneurship, and information systems. The full list of journals is represented in Appendix A.

Table 3
Inclusion and Exclusion criteria.

Inclusion criteria	
Language	English
Timespan	Since 2000 to December 31, 2024
Document types	Empirical, conceptual and literature reviews
Source	Peer-reviewed journals in the subject areas of business, management, accounting, finance, economics, social science and decision science
Research focus	Agile methodologies; digital entrepreneurship, digital business models, business model innovation, digital platforms, ecosystems, and technologies
Exclusion criteria	
Document types	Book chapters, books, conference articles, editorials, reports and notes
Source	Highly practitioner-oriented rather than academic perspectives, without any theoretical connection.
Research focus	Articles that mention agility and DE concepts and elements but do not specifically focus on these concepts from a value-creation perspective

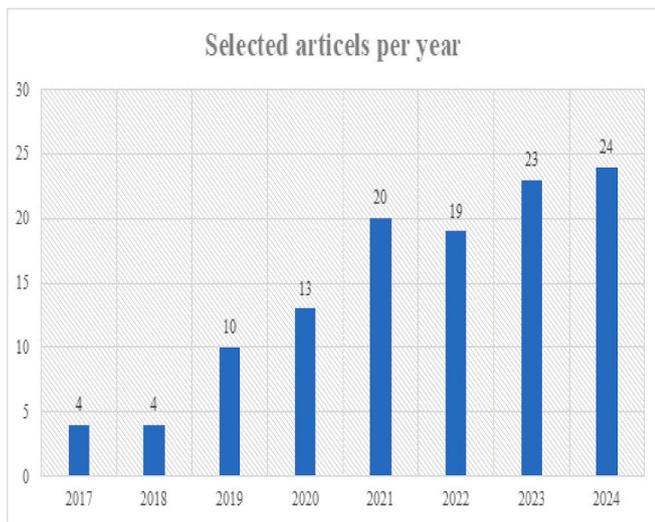


Fig. 2. Publications per year of selected articles (n = 117).

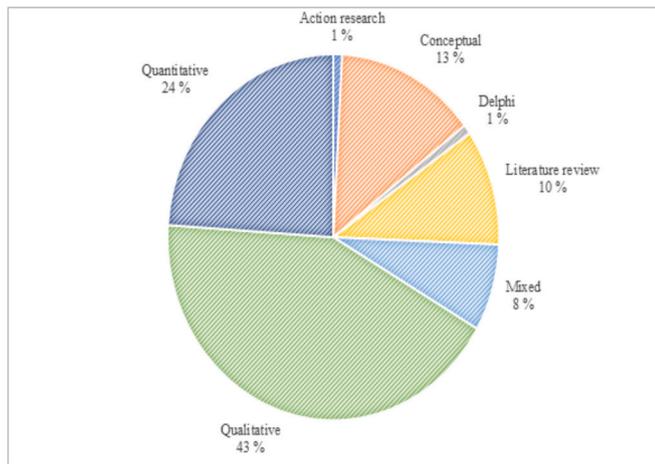


Fig. 3. Research methods.

4.2. Geographical setting and industry context

Remaining consistent with the previous literature review (Zaheer et al., 2019), the current SLR identified and coded the geographic locations explicitly stated as the research setting in the reviewed articles. Articles with no explicit geographic locations, such as conceptual studies or literature reviews, were coded to the corresponding author’s country of origin. Fig. 4 shows that more than 80 % of agile co-creation and DE nexus research is from high-level income countries, including Italy, Germany, USA, UK, Sweden, Australia, Denmark, France, Spain, Austria, Finland, Netherlands, Belgium, Canada, Ireland, Norway, Romania, South Korea, Switzerland, Portugal, UAE, and Hong Kong. Four studies employed large-sample, quantitative research designs using cross-country data drawn from Europe and North America, i.e. Akhtar et al. (2018), Claus et al. (2019), Ebersberger and Kuckertz (2021), and Usai et al. (2021). This dominance reveals a western-centric orientation, where theoretical development is disproportionately shaped by mature institutional settings and well-established research infrastructures. Such bias may obscure how agile co-creation and DE unfold under resource-scarce or other institutionally diverse contexts. Furthermore, the concentration of research in ICT-intensive economies suggests that knowledge production is shaped by contexts where agile practices are already deeply embedded, narrowing the scope for developing theories that reflect alternative DE trajectories (Annosi et al., 2023; Santoso, 2024). While the scarcity of research outside high-income countries is partly attributable to resource constraints, it also presents a missed opportunity to capture the dynamics of DE in emerging economies, where entrepreneurial activity and digital adoption are accelerating (Global Innovation Index, 2024).

Regrading industry context, the current SLR reveals that 61 % of empirical studies focus on the software and ICT service industry (see Fig. 5), with digital startups as the dominant unit of analysis. While this emphasis aligns with the origins of agile methods, it reinforces an ICT-centric bias that narrows the understanding of agile co-creation in DE. Some diversification is visible, particularly through studies exploring digital servitisation in industrial manufacturing (e.g. energy, construction, mining), ICT hardware, and retail sectors, reflecting a gradual extension of inquiry beyond the startup realm. However, these explorations remain fragmented, with very limited attention to sectors such as financial services (Hutter et al., 2023) or entertainment and leisure (Breier et al., 2021; Chalmers et al., 2021; Sanasi, Manotti and Ghezzi, 2021). The current evidence base, therefore, disproportionately reflects contexts where ICT capabilities are already central to business models, rather than testing the adaptability of agile co-creation in more

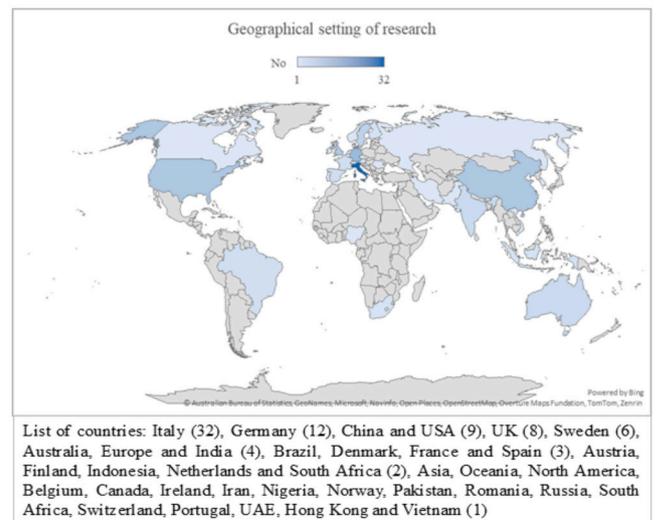


Fig. 4. Geographical setting.

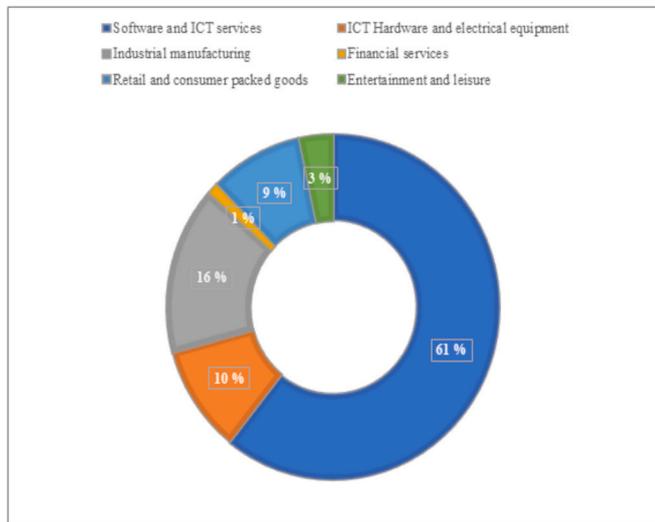


Fig. 5. Industry context (n = 88, empirical study only).

traditional or underexplored sectors. This narrow industry distribution underscores the need for future research to justify and expand the theorisation of *digital servitisation* as a promising but underdeveloped dimensions of the agile co-creation and DE nexus (Lehmann, Recker, Yoo and Rosenkranz, 2022; Neumeyer et al., 2025).

In these underexplored settings, agile co-creation offers a means to empirically mitigate core DE challenges. In non-ICT sectors, such as agriculture, manufacturing, and healthcare, agile co-creation enables entrepreneurs to experiment with digital solutions incrementally, aligning technological adoption with local needs and resource availability (Jovanovic et al., 2022; Zhang et al., 2023). Similarly, in emerging economies, agile co-creation fosters continuous learning and stakeholder collaboration that help overcome institutional voids, infrastructural weakness, and market volatility (Kohtamäki et al., 2020). By facilitating low-cost experimentation, shared accountability, and rapid feedback cycles, agile co-creation provides entrepreneurs with flexible pathways to innovate despite environmental constraints (Sjödin et al., 2020). Empirically examining these processes could eliminate how context-sensitive forms of agile co-creation contribute to inclusive digital transformation and expand the theoretical boundaries of DE beyond the ICT-dominant paradigm.

5. Content analysis: Toward an integrated framework

Based on the content analysis and synthesis, the current study develops an integrated framework (Fig. 7) that conceptualises the nexus between agile co-creation and DE across three core thematic dimensions: (i) *primary motivations*; (ii) *principal challenges and critical*

Table 4 List of identified themes.

Theme	Frequency (# of articles)	% of total (N = 117)
Innovation and innovative offerings	52	44.4
Learning and adaptation	44	37.6
Digital startups	39	33.3
Digital servitisation	33	28.2
Top management support and scepticism	29	24.8
Budget and right customer groups	26	22.2
Time frame and objective-oriented micro-phases	24	20.5
Ownership and dynamic team	21	17.9
Prioritisation	19	16.2
Mindset	17	14.5

success factors; and (iii) *anticipated outcomes*. Each dimension is elaborated in the following sections. To ensure methodological transparency and analytical rigor, a frequency table (Table 4) summarises the distribution of themes and codes across the 117 reviewed studies, while a co-occurrence matrix (Appendix B) and a network visualisation map (Fig. 6) illustrate conceptual clustering and interrelationships. Building on these analyses, the study further introduces an *agile co-creation typology* (Fig. 8) comprising four modes: *opportunity discovery*, *rapid learning*, *strategic agility*, and *incremental innovation*, which together capture how agile co-creation practices evolve across varying levels of uncertainty and organisational adaptiveness. This typology provides a basis for theorising agile co-creation as a dynamic, context-contingent process within DE.

5.1. Primary motivations

Innovation and learning emerge as two primary motivations underpinning the nexus between agile co-creation and DE. In increasingly dynamic and fast-evolving digital environments, firms engage in agile co-creation to accelerate innovation in products, services, and business models (Amit & Han, 2017; Ghezzi & Cavallo, 2020; Sjödin et al., 2020). Agile co-creation fosters *iterative experimentation*, *rapid feedback loops*, and *user centric design*, all of which are critical conditions for innovation in the DE context (Ghezzi & Cavallo, 2020; Sjödin et al., 2020). At the same time, this approach offers *continuous learning opportunities* that enable firms to adapt to *rapid technological shifts*, *evolving customer needs*, and *regulatory changes* (Antonopoulou & Begkos, 2020; Mariani & Nambisan, 2021; Nobari & Dehkordi, 2023). Thereby, the interplay between agile co-creation and DE is not only a mechanism for *innovation* but also a strategic *learning* process that enhances *adaptability* and *resilience* in highly uncertain environments (Amit & Han, 2017; Ghezzi & Cavallo, 2020; Marcon et al., 2024; Nambisan, 2017; Sussan & Acs, 2017).

In the current study, we broadly set out to understand the role of the agile co-creation approach in creating and exploiting entrepreneurial opportunities in digital contexts. Notably, the agile co-creation approach in the DE context implies that firms take an active role in creating and exploiting entrepreneurial opportunities through interaction to realise the promise of DE (Ghezzi & Cavallo, 2020; Sjödin et al., 2020). In turn, the firms extend the scope of interactions with customers from *transaction-based collaboration* to *relationship-based collaboration* (Chatterjee et al., 2023; Duong, 2024; Kim & Park, 2024; Mero et al., 2022). For instance, “Spotify” exemplifies agile co-creation by continuously refining its recommendation algorithms, playlists, and user interface based on real-time listener feedback and behavioral data. This iterative process transforms listeners from passive consumers into active co-creators of the platform’s evolving experience. Similarly, “Revolut”

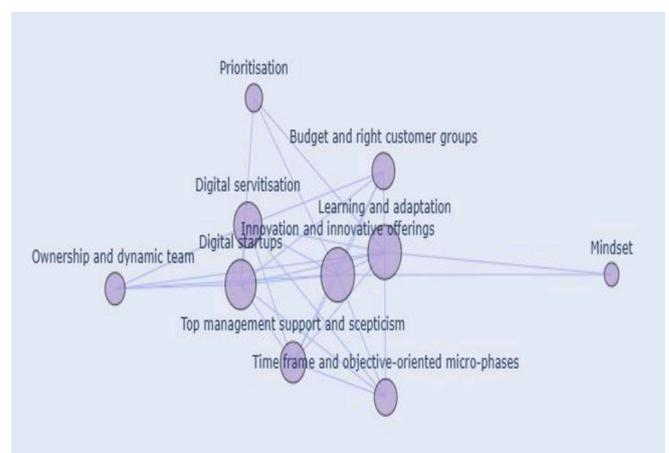


Fig. 6. Network visualisation of identified themes.

applies agile co-creation in financial services by frequently testing and releasing new features, such as, budgeting tools, cryptocurrency trading, or cross-border payments, in close collaboration with its user community. Revolut actively gathers feedback from beta users and online forums, integrating insights into rapid development cycles. These examples illustrate how agile co-creation fosters both *innovation* and *learning* in DE by embedding users into ongoing, *data-driven collaboration* (Ghezzi & Cavallo, 2020).

In the present SLR, we started by looking at the role of agile co-creation in DE on its particular characteristic, namely “*agility*” (Qumer & Henderson-Sellers, 2006). This attempt gives us more insight into how agile co-creation helps entrepreneurial agencies (individuals and collectives) create and exploit entrepreneurial opportunities in the DE context. Our findings reveal that agility enhances *entrepreneurial capacity* through *flexibility*, *speed*, *learning*, *responsiveness*, and *lean development attributes* that are foundational to agile co-creation in digital contexts (de Souza et al., 2020; Ghezzi & Cavallo, 2020; Mero et al., 2022; Sadreddin & Chan, 2023; Sjödin et al., 2020). This process supports the *co-creation* of value and opportunity recognition across multiple levels: *micro*, *meso*, and *macro* (de Souza et al., 2020; Turienzo et al., 2024). At the *micro-level*, agile co-creation engages individual entrepreneurs, end-users, and cross-functional teams (e.g. *designers*, *developers*, or *programmers*) in rapid prototyping and *minimum-viable-product (MVP)* cycles, which both spur innovation and reinforce *experimental learning* (de Souza et al., 2020; Tritoasmoro et al., 2024). At the *meso-level*, it aligns organisational processes and knowledge flows by cultivating *collective learning cultures* and legitimising novel offerings while mitigating risks (Alford & Jones, 2024; Felicetti et al., 2024). At the *macro-level*, agile learning processes support firms in integrating and reconfiguring digital and regulatory resources, especially *customer data into strategic assets*, thereby enhancing long-term competitiveness (Ghezzi & Cavallo, 2020; Sjödin et al., 2020).

This analysis is further grounded in *effectuation* theory and the *dynamic capabilities* framework, which together provide a robust theoretical lens for understanding agile co-creation in DE contexts (Jia et al., 2024; Nambisan, 2017; Sarasvathy, 2001; Teece, 2018). Effectuation theory explains how entrepreneurial actors start not with predetermined goals but with available means, such as, knowledge, networks, and resources, and iteratively co-create new opportunities in collaboration with stakeholders (Sarasvathy, 2001; Thomson et al., 2023; Xiang et al., 2024), driving both *innovation* and *learning*. This perspective is highly relevant to agile co-creation, where *uncertainty* and *unpredictability* is inherent, and value emerges through cycles of *experimentation*, *feedback*, and *stakeholder engagement* rather than linear planning (Bunduchi et al., 2022; Cheng et al., 2023). In parallel, the *dynamic capabilities* framework emphasises a firm’s higher-order abilities to sense, seize and reconfigure internal and external resources to sustain competitiveness in rapidly changing environments (Giacosa et al., 2022; Lamperti et al., 2023; Teece, 2018). Agile co-creation directly contributes to this process by embedding adaptive routines of *learning*, *collaboration*, and *resource recombination* that enhance organisational responsiveness (Cocchi et al., 2023; Sadreddin & Chan, 2023). Taken together, these perspectives reveal that agile co-creation operates simultaneously as a micro-level entrepreneurial logic (effectuation) and as a macro-level strategic capability (dynamic capabilities). This dual framing enriches our understanding of agile co-creation as both a *learning process* that generates entrepreneurial opportunities under uncertainty and a strategic mechanism that enables *adaptability* and *long-term resilience* in turbulent digital ecosystems (Mero et al., 2022; Sala et al., 2022; Trabucchi & Baganza, 2022).

5.2. Principal challenges and critical success factors

5.2.1. Navigating top management scepticism and support

Top management scepticism frequently emerges as a central barrier during the adoption of agile co-creation in the DE context. This

hesitation is particularly visible among investors and senior decision-makers (Ajah, 2023; Mula et al., 2024), who may hold misconceptions or limited understanding of agile principles and practices (Balocco et al., 2019; Zoppelletto et al., 2023). Some executives perceive agile co-creation as short-term and tactical, thereby underestimating its capacity to serve long-term strategic goals (Li et al., 2021; Oliva et al., 2018). At the same time, managerial support has proven to be a decisive factor for successful implementation (Giacosa et al., 2022; Knudsen et al., 2021). Such support operates at both material and cognitive levels: financing experimentation, on the one hand, and providing strategic guidance, knowledge, and leadership commitment, on the other hand (Bunduchi et al., 2022; Swartz et al., 2022). Rather than representing a simple dichotomy between scepticism and support, organisations often experience an evolving dynamic in which leadership attitudes shift as agile initiatives yield measurable outcomes (Barroso & Laborda, 2022).

Managerial scepticism primarily persists due to organisational and environmental factors (Jafari-Sadeghi et al., 2023; Lange et al., 2023). In less digitised firms, resistance tends to stem from cultural inertia and a reliance on intuitive, *experience-based decision-making* rather than empirical experimentation (Andersen et al., 2022; Kollmann et al., 2021). Incumbent firms, in particular, often show demotivation to engage in experimentation, even when digitisation promises scalable outcomes. This resistance is often rooted in *intuitive decision-making* (e.g. gut feeling) and a preference for the familiar, traditional project management approaches (Li et al., 2021; Malodia et al., 2023). In contrast, within highly digitised environments, scepticism is more closely linked to external uncertainty (Centobelli et al., 2022; Sanasi et al., 2023). Startups operating in fast-moving digital markets face intense competitive pressures, where agile experimentation may be perceived as risky due to the threat of rapid imitation before innovations can be fully commercialised (Balta et al., 2024). To navigate these tensions, firms must strike a balance between agile experimentation and timely market deployment. Encouraging an *innovation-oriented leadership* culture, combined with clear strategic alignment, can help transform management scepticism into proactive support, enabling the effective implementation of agile co-creation in DE contexts (Aslam et al., 2024; Becker & Schmid, 2020).

5.2.2. Balancing budgetary pressures with customer focus

Budget constraints are a recurrent challenge in implementing agile co-creation in DE contexts. Despite substantial investments in developing *customer-driven digital innovations*, many firms struggle to create scalable value, risking low returns on investment (Bhatti et al., 2021; Sadreddin & Chan, 2023; Sanasi et al., 2020). Investor expectations for rapid monetisation further intensify pressure to deliver quick, measurable outcomes (Cavallo et al., 2019), creating tension between experimentation and financial sustainability (Bouncken et al., 2021; Moi & Cabiddu, 2021).

In practice, organisations navigate this tension by carefully selecting and prioritising customer groups early on. Rather than spreading resources thinly, focusing on *niche* or *lead-user segments* provides more actionable feedback, reduces resource waste, and accelerates *product-market fit* (Chengbin et al., 2022; Snihur et al., 2021). This approach aligns with effectuation theory (Sarasvathy, 2001), where entrepreneurs leverage affordable losses and early stakeholder commitments to guide opportunity development. Strong connections with both external customers and internal development teams reinforce feedback loops that make iterative processes more cost-efficient (Ghezzi et al., 2022; Ilmudeen, 2022).

Additionally, well-designed user interfaces and experiences (UI/UX) facilitate productive feedback loops (Lehman et al., 2022; Nambisan et al., 2017; Raneri et al., 2023), while *digital platforms* (e.g. GitHub, Product Hunt) and tools (e.g. Jira, Trello) enhance interaction and responsiveness (Elia et al., 2020; Nambisan, 2017; Song, 2019). To leverage these tools effectively, firms require both technical skills and strategic understanding (Harms & Schwery, 2020; Zheng et al., 2021). In

moderately digitised settings, lean practices such as *Minimum-Viable-Products (MVPs)*, *Business Model Canvas (BMC)* and *Get-Out-of-the-Building (GOOB)* remain effective and help firms manage costs while validating assumptions (Balocco et al., 2019; Chengbin et al., 2022).

5.2.3. Managing temporal pressures through micro-phased iteration

Operating under compressed timeframes represents a persistent challenge for digital entrepreneurs adopting agile co-creation. In fast-paced, competitive, and turbulent digital markets, speed is essential for achieving a *product-market fit* and *sustaining competitive advantage* (Aslam et al., 2024; Cosa, 2024; Knudsen et al., 2021). Yet the same urgency can undermine product quality and complicate efforts to anticipate shifting customer needs (Ghezzi & Cavallo, 2020; Matarazzo et al., 2021). Firms therefore face a temporal dilemma: how to move quickly without compromising *learning* or *strategic depth* (Wang et al., 2023).

Although digital firms often have access to large volumes of customer data, extracting actionable insights remains a challenge due to information overload and signal-to-noise confusion (Alford & Jones, 2024; Balta et al., 2024; Nambisan, 2017; Rayna & Striukova, 2021; Zhang et al., 2023). To address this, many organisations adopt *objective-oriented micro phases*, a strategy that breaks broader goals into smaller, time-bound experiments (Ghezzi & Cavallo, 2020; Sjödin et al., 2020). These short cycles enable *rapid testing*, reduce *resource risk*, and improve *agility* in responding to failure (Balocco et al., 2019; Chengbin et al., 2022). Central to this approach is the “fail-fast” principle, which promotes early failure as a means to accelerate learning and maintain momentum (Chengbin et al., 2022; Laptev & Shaytan, 2022; Silva et al., 2020).

This practice resonates with the theory of *dynamic capabilities* (Teece, 2018; Teece et al., 1997). By deliberately pacing activities into *micro-cycles*, firms can reconcile the need for *short-term responsiveness* with *long-term adaptability* (Heubeck, 2023). In practice, successful organisations, do not simply accept or overcome time constraints; they develop *routines* to continuously reallocate attention, resources, and goals across overlapping cycles (Barroso & Laborda, 2022). Such routines help sustain *innovation* momentum under high temporal pressure, turning time from a rigid constraint into a managed, renewable source for agile co-creation in DE (Heubeck, 2023; Konopik et al., 2022).

5.2.4. Reconciling ownership clarity with dynamic team collaboration

Another recurring challenge in agile co-creation within the DE context is the *ambiguity of project ownership*. Because agile co-creation emphasises collaboration and shared responsibility among team members (Ghezzi & Cavallo, 2020), organisations sometimes struggle with *accountability*, *decision-making*, and *communication* (Paluch et al., 2020; Sjödin et al., 2020). This challenge is less about choosing between *centralised ownership* and *decentralised collaboration*, and more about designing mechanisms that allow *clarity and flexibility* to coexist (Silva et al., 2020; Sjödin et al., 2020).

Dynamic teams offer one way to navigate this balance. A dynamic team refers to a group of individuals capable of adapting to change while maintaining *effective communication*, *high trust*, and *shared engagement* (Beliaeva et al., 2020; Christofi et al., 2023; Cosenz & Bivona, 2021). Defining clear roles and responsibilities within such teams enhances *clarity and accountability* (Narvaiza et al., 2023; Nzembayie et al., 2024). Additionally, regular coordination rituals, such as *daily stand-ups* and *sprint reviews*, reinforce *shared ownership and alignment* (Chengbin et al., 2022; Oliva et al., 2018; Sadreddin & Chan, 2023), while structured mechanisms such as *team voting systems*, *escalation paths*, and a clearly defined *Definition of Done (DoD)* ensure accountability without undermining collective engagement (de Souza et al., 2020; Harms & Schwery, 2020). In sum, the bottleneck of project ownership in agile co-creation could easily be resolved by developing a dynamic team that integrates *collaboration with clear accountability*. Theoretically, this reflects the principles of *shared leadership* (Pearce & Conger, 2002). Agile co-

creation does not eliminate ownership; it redistributes it dynamically across individuals and phases, requiring both rational and coordination and formalised anchors. Organisations that succeed are those able to combine participatory decision-making with clear *governance frameworks*, thereby transforming potential ownership bottlenecks into a source of *team resilience and innovation* (Ghezzi & Cavallo, 2020; Heubeck, 2023).

5.2.5. Balancing prioritisation with a learning-oriented culture

Prioritisation is a critical yet complex challenge in agile co-creation within DE. It requires organisations to systematically assess and rank tasks, features, or objectives according to strategic importance and urgency (Centobelli et al., 2023; Troise et al., 2023). *Conflicts* often arise when different stakeholders, such as entrepreneurs, investors, and developers, hold diverging views about what should take precedence. For instance, founders may emphasise *product refinement* while investors push for *rapid market entry*. Without a structured prioritisation approach, firms risk *strategic misalignment* and *inefficient resource allocation* (Balta et al., 2024; Cavallo et al., 2024; van Eechoud & Ganzaroli, 2023).

A *learning-oriented mindset* offers a way to navigate these tensions (Lange et al., 2023; Llopis-Albert et al., 2021; Sjödin et al., 2020; Zhao et al., 2023). By embedding a culture of *continuous improvement*, *knowledge sharing*, and *adaptive thinking*, firms can transform prioritisation from a static ranking exercise into an ongoing process of *collective sensemaking* (Corvello et al., 2024; Ghezzi & Cavallo, 2020; Zaheer et al., 2022). Regular routines, such as *sprint reviews*, *daily stand-ups*, or *retrospectives* provide institutionalised spaces for reflection, enabling teams to evaluate trade-offs, surface hidden assumptions, and recalibrate priorities dynamically (Chengbin et al., 2022; de Souza et al., 2020; Xiang et al., 2024). These practices promote *calculated risk-taking*, *decentralised decision-making*, and *learning from failure*, thereby helping firms make better prioritisation decisions while remaining agile (Ghezzi & Cavallo, 2020; @Sadreddin et al., 2023; Thronton, 2024). Theoretically, this reflects the principles of *dynamic capabilities* (Teece et al., 1997) and organisational learning (Fiol & Lyles, 1985). Agile co-creation is not about resolving the choice between *prioritisation* and *learning*, but about *cultivating routines* that enable the two to reinforce each other. Effective organisations are those that develop the capability to continuously prioritise in the face of uncertainty while simultaneously fostering a culture that treats *learning as a strategic asset*. In doing so, they build *resilience* against shifting market demands and maintain long-term competitiveness (Jia et al., 2024; Konopik et al., 2022).

5.3. Anticipated outcomes

5.3.1. Digital startups

In line with Schumpeterian entrepreneurship, which highlights the importance of *innovation*, *creative destruction*, and *high-risk, high-impact ventures* (Schumpeter, 1934), we position digital startups as a key outcome of the agile co-creation and DE nexus. Yet, scholars diverge in defining digital startups (Kraus et al., 2019). For example, Zaheer et al. (2019) describe them as early-stage firms or corporate units where digital technologies enable at least one critical component of the business model, while Bohn and Kundisch (2020) emphasise resource-constrained, nascent organisations developing software-based innovations. Building on these perspectives, we define *digital startups as newly established technology-driven ventures, either independently founded or corporate-backed, that prioritise innovation and growth leveraging strong digital capabilities*. Our definition particularly emphasises the role of digital capabilities in enabling these ventures to implement and evolve their business models effectively.

Digital startups hold several competitive advantages over traditional businesses in terms of their *digital capabilities*, spanning to *value creation*, *technology adoption*, and *funding*. Unlike traditional businesses, digital startups can optimise their value with *innovation*, leveraging *data-driven strategies* that make them highly competitive in the digital economy

(Amit & Han, 2017; Steininger, 2019). By adopting agile co-creation as a value-creation approach, digital startups can experiment faster and bring changes if required (Ghezzi & Cavallo, 2020; Sjödin et al., 2020). The substantial advances in *cloud computing* and *communication technologies* have expanded digital startups' resources and enhanced the effectiveness with which resources are exchanged, combined and integrated (Amit & Han, 2017; Kraus et al., 2019; Zaheer et al., 2019). Such developments have laid the foundations for the rise of software and ICT service industries (Nambisan, 2017). Moreover, the power of individual customers as "value co-creators" has been augmented because of the dissemination of product or service information from newly emerged *digital platform-oriented entrepreneurship ecosystems* such as *digital innovation platforms* (e.g. Google Android System), *open-source platforms* (e.g. GitHub), *chatroom platforms* (e.g. Slack channels) and *digital marketplaces* (e.g. Shopify) (Bejjani et al., 2023; Elia et al., 2020; Song, 2019; Sussan & Acs, 2017). Such disseminated information allows customers to assess products and services holistically and engage in collaborative bargaining (Amit & Han, 2017; Autio et al., 2018; Beliaeva et al., 2020). As a result, advanced technology adoption has unlocked individual customers' potential as contributors of value-creating data resources such as *machine learning*, *artificial intelligence*, *3D technology*, *blockchain technology*, *cloud computing services*, and *IoT* (Balta et al., 2024; Rayna & Striukova, 2021; Sussan & Acs, 2017). These competitive advantages enhance both the scope and nature of resources that digital startups can access and leverage, which, in turn, may lead to the conceiving and designing of *novel resource configurations* (Amit & Han, 2017; Marcon et al., 2024).

Moreover, the rapid global diffusion of the "venture accelerator" concept harnesses technology affordances that facilitate entrepreneurial opportunities pursued by digital startups (Autio et al., 2018; Cavallo et al., 2019). The traditional concept of "venture capital" has been transformed through the emergence of alternative funding mechanisms, such as "angel investment" and "crowdfunding", making venture capital increasingly *location-agonistic* (Autio et al., 2018; Cavallo et al., 2019). These advancements have enabled digital startups' founders to overcome early-stage funding challenge, as such technology affordances are *open*, *transverse national boundaries*, and *connect entrepreneurs with a global investment community* (Srinivasan & Venkatraman, 2018; Sussan & Acs, 2017; Zaheer et al., 2019). As an illustration, unlike traditional venture capital sources, recently surfaced investor-focused digital platforms such as *AngelList*, *CrunchBase*, *Republic* and *SeedInvest* offer a new competitive advantage to digital startup' founders by enhancing *visibility* and expanding access to *diverse investment networks* (Elia et al., 2020; Zaheer et al., 2022).

5.3.2. Digital servitisation

In recent years, many traditional product-oriented businesses have shifted toward *service-oriented models*, facilitated by digital technologies such as *AI*, *IoT*, and *cloud computing* (Hsuan et al., 2021; Kohtamäki et al., 2020). This shift, aligned with Kirznerian entrepreneurship, which emphasises *alertness to opportunity* and *incremental innovation* (Kirzner, 1973), thereby representing a convergence of *digitisation* and *servitisation* (Kohtamäki et al., 2019; Kollmann et al., 2021). Digital servitisation represents the second major outcome of the agile co-creation and DE nexus, characterised by *greater flexibility*, *deeper customer engagement*, and *enhanced scalability* (Dana et al., 2024; Paul et al., 2023).

Sjödin et al. (2020, p. 478) define digital servitisation as "the transformation in processes, capabilities, and offerings within industrial firms and their associated ecosystems to progressively create, deliver, and capture increased service value arising from a broad range of enabling digital technologies". The study highlights that value co-creation occurs at the *customer interface*, not within isolated R&D labs, thus reinforcing the importance of agile co-creation. Similarly, Kohtamäki et al. (2019) highlight how *smart product-service-software systems* enable value creation through *monitoring*, *control*, *optimisation*, and even *autonomous functioning*. Building on these insights, we define *digital*

servitisation as the transformation of traditional product-oriented businesses into service-oriented firms by integrating digital technologies into their offerings, and to do that, a minimum level of digital dynamic capabilities is required to achieve (Hsuan et al., 2021; Kohtamäki et al., 2020; Lamperti et al., 2023; Narvaiza et al., 2023). As illustrative examples, the updated solutions of *John Deere* leverage *IoT-enabled tractors* and *cloud-based platforms* to provide farmers with predictive insights on yields, soil quality, and machinery performance, transforming tractors into *data-driven service systems*. Likewise, "Philip's HealthTech" ecosystem integrates connected devices and the cloud-based "HealthSuite" platform to deliver *remote monitoring*, *predictive diagnostics*, and *outcome-based healthcare services*. Both cases illustrate how digital servitisation embeds value-adding services into traditional product offerings, creating new revenue streams and closer customer relationships (Kohtamäki et al., 2020; Kollmann et al., 2021).

Central to this transformation are *digital dynamic capabilities* as "enabling mechanisms" that may foster smooth transition (Akhtar et al., 2018; Kamble et al., 2023; Troise et al., 2023). These capabilities represent *higher-order competences* that determine a firm's ability to *integrate*, *build* and *reconfigure* internal and external resources in response to rapidly changing business environments (Matarazzo et al., 2021; Teece, 2018). To develop *digital dynamic capabilities*, firms must cultivate robust *sensing*, *learning*, *integrating*, and *coordinating* competences within digital contexts (Cenamor et al., 2019; Ilmudeen, 2022). *Sensing* refers to a firm's ability to identify, *co-develop*, and evaluate *digitalisation trends* and technological opportunities aligned with customer needs. *Learning* involves renewing existing capabilities through the acquisition and application of new knowledge. Once opportunities are identified, firms must reconfigure existing resources and acquire new ones to support *innovation* and generate novel insights. *Integrating* capabilities enable the assimilation of this knowledge at the organisational level, facilitating the effective deployment of *reconfigured operational capabilities*. Finally, *coordinating* capabilities involve orchestrating the resources, specifically, the abilities to organise tasks, align activities, and manage resources in ways that convert them into *routine*, *value-generating capabilities* (Matarazzo et al., 2021; Teece, 2018). By cultivating these capabilities, firms can not only transition into *service-oriented models* but also sustain *innovation and growth* within digitally mediated ecosystems (Matarazzo et al., 2021; Teece, 2018). Below, Fig. 7 presents our integrated framework.

5.4. A typology of agile co-creation

Fig. 8 presents a typology of agile co-creation that integrates insights from effectuation, shared leadership, and dynamic capabilities theories. The typology positions agile co-creation practices along two key contingencies: *the level of uncertainty* faced by the organisation and *the level of organisational adaptiveness* it exhibits. Four archetypal forms of agile co-creation emerge from this intersection.

At high levels of uncertainty and low adaptiveness, *opportunity discovery* represents early-stage, experimental forms of agile co-creation. Guided by effectual logic and mechanisms such as *affordable loss* (Sarasvathy, 2001), digital ventures focus on exploring emerging opportunities with limited resources (Thomson et al., 2023; Xiang et al., 2024). As adaptiveness increases under continued uncertainty, organisations progress toward *rapid learning*, where collective intelligence (Elia et al., 2020) and shared accountability, rooted in shared leadership theory (Pearce & Conger, 2002), enable organisations to iterate swiftly and absorb feedback from dynamic environments (Cheng et al., 2023; Giacosa et al., 2022; Heubeck, 2023).

At the lower end of uncertainty, agile co-creation shifts toward capability refinement (Breier et al., 2021). In this regard, when organisational adaptiveness remains limited, *strategic agility* becomes central (Akhtar et al., 2018; Kohtamäki et al., 2020). Firms rely on dynamic capabilities of *reconfiguration* and *resource renewal* to align existing assets with evolving market needs (Sanasi et al., 2021; Troise et al., 2023).

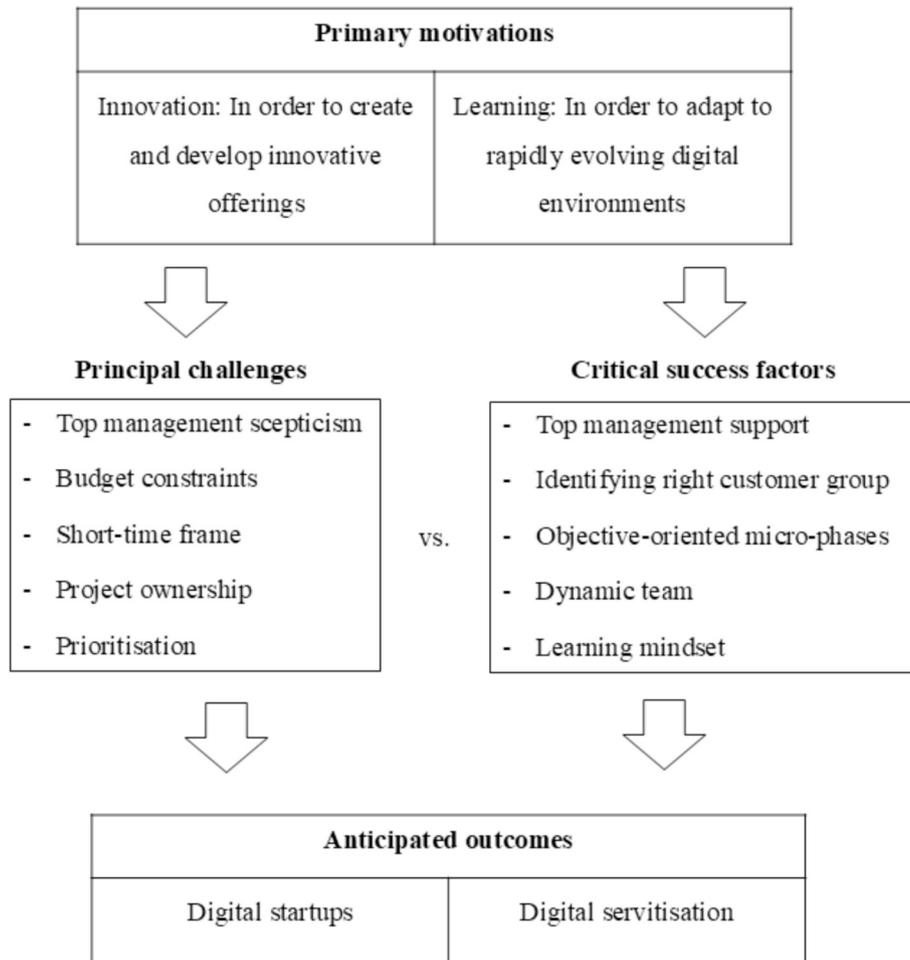


Fig. 7. Integrated framework of agile co-creation and DE nexus.

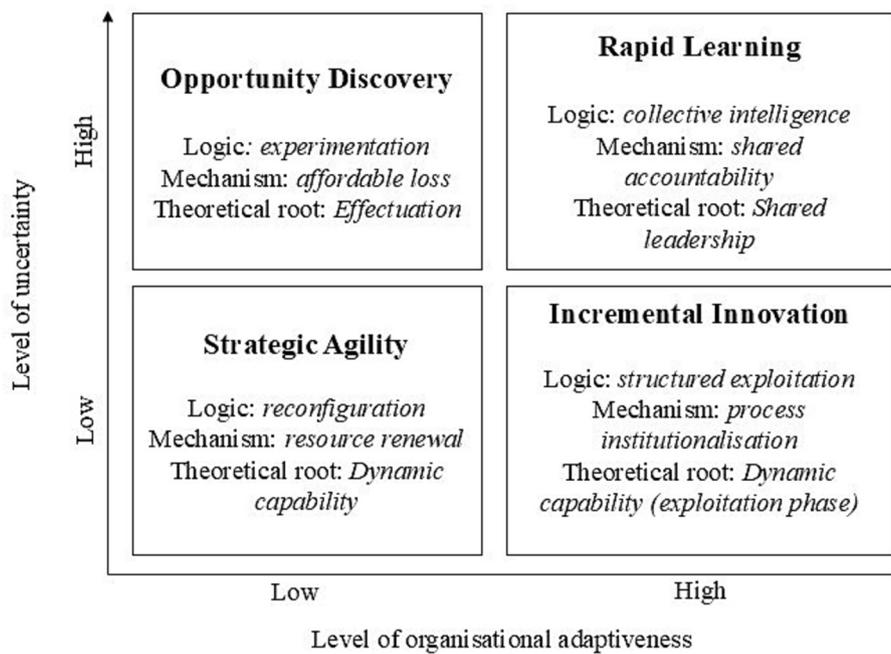


Fig. 8. Agile co-creation Typology.

Finally, under conditions of both low uncertainty and high adaptiveness, agile co-creation takes the form of *incremental innovation* (Aslam et al., 2024; Bunduchi et al., 2022; Kirzner, 1973). Here, *structured exploitation* and *process institutionalisation* prevail, reflecting the exploitation phase of dynamic capability theory (Beliaeva et al., 2020; Centobelli et al., 2022; Teece, 2018). In such contexts, established routines, refined processes, and accumulated experiential knowledge enable *continuous improvement*, allowing organisations to optimise performance, enhance efficiency, and sustain innovation trajectories over time (Teece, 2018).

Taken together, the typology illustrates that agile co-creation is not a uniform practice, but a *context-dependent continuum* of logics and mechanisms (Cocchi et al., 2023; Sjödin et al., 2020). Organisations progress across these types of uncertainty declines and adaptive capacity develops, suggesting a temporal trajectory from *effectual exploration* to *capability-driven exploitation* (Giacosa et al., 2022; Hutter et al., 2023; Sjödin et al., 2020). This framework thus extends current understanding by linking micro-level experimentation (Moi & Cabiddu, 2021) with macro-level organisational learning (Mero et al., 2022), offering a foundation for future empirical research on how digital ventures navigate transitions between different modes of agile co-creation.

6. Future research directions, limitations, and conclusion

6.1. Multilevel understanding

We observe an increasing interest among scholars in examining how agile co-creation shapes the creation and exploitation of entrepreneurial opportunities within DE contexts (Cocchi et al., 2023; Nambisan, 2017; Sjödin et al., 2020). However, the literature still lacks a nuanced, *multilevel understanding* of this relationship (Paul et al., 2023). Most existing studies focus on the *firm level*, exploring how entrepreneurial firms adopt agile co-creation to generate value and gain competitive advantage. This focus, while valuable, overlooks the influence of *individual entrepreneurial characteristics, socio-cultural and institutional dynamics*, and the broader *regulatory and ecosystem-level* conditions that shape DE (Neumeyer et al., 2025). To advance this field, future studies should adopt a *multilevel analytical lens*, capturing the interplay between *micro-level* entrepreneurial behaviours and actions, *meso-level* organisational and institutional forces, and *macro-level* environmental conditions and regulations.

Moreover, empirical work is warranted to investigate how agile co-creation helps firms investigate *digitalisation paradoxes* i.e. situations in which heavy investments in digitalisation yield diminishing or even negative returns (Ghezzi & Cavallo, 2020; Neumeyer et al., 2025). For instance, while digital platforms can enhance real-time customer interaction, they also risk locking firms into costly technological dependencies. Agile co-creation may integrate such risks by emphasising iterative experimentation and stakeholders feedback loops, which help firms recalibrate investments before navigating dependencies emerge (Bhattacharyya & Subrahmanya, 2024; Sjödin et al., 2020). Similarly, in contexts of *rapid technological change* and *strong network effects*, agile co-creation can provide mechanisms for balancing exploration with exploitation, thereby reducing uncertainty and resource waste (Sjödin et al., 2020). In Table 5, we list the synthesis of these future research directions.

6.2. Multilevel theorising

Future research should pursue *multilevel theorising* by integrating theories across *individual, organisational, and ecosystem* levels to explain the agile co-creation–DE nexus. At the *micro-level*, theories such as *entrepreneurial networking* (Stam et al., 2014), *bricolage* (Baker & Nelson, 2005), and *effectuation* (Sarasvathy, 2001) help capture how entrepreneurs improvise, reconfigure resources, and co-create with stakeholders under uncertainty. At the *meso-level*, theories such as *dynamic capabilities* (Teece, 2018), *organisational learning* (Fiol & Lyles, 1985) and

Table 5
Synthesis of future research agenda.

Core paradigms	Key contents	Exemplary questions/ explanation
<i>Multilevel understanding</i>	<ul style="list-style-type: none"> - Micro-level entrepreneurial actions - Meso-level institutional and social dynamics - Macro-level digital environmental conditions and regulations 	<ul style="list-style-type: none"> - What individual characteristics, practices and cognitive attributes influence effective agile co-creation within the context of DE? - How do entrepreneurs navigate the trade-off between iterative development and the digitalisation paradox in agile co-creation process? - In what ways do manufacturing firms incorporate agile co-creation to innovate their business models? - How can traditional product-oriented firms leverage agile co-creation to co-develop digital service innovations? - How does agile co-creation support the survival and growth of digital startups beyond the initial stand-up phase? - How do incumbent firms adopt agile co-creation practices within their organisational structures in order to scale? - To what extent and how do digital entrepreneurship ecosystems' actors contribute to adopting agile co-creation and developing DE?
<i>Multilevel theorising</i>	<ul style="list-style-type: none"> - Micro level theories, e.g. entrepreneurial networking, bricolage or effectuation - Meso-level theories, e.g. dynamic capabilities, organisational learning or institutional theory - Macro-level concepts, e.g. digital entrepreneurship ecosystems 	<ul style="list-style-type: none"> - Future studies could provide more comprehensive insights into the agile co-creation and DE nexus through multilevel theorising, integrating perspectives across individual, organisational, and ecosystem levels.
<i>Boundary condition perspectives</i>	<ul style="list-style-type: none"> - Level of digitisation - Industry - Geographic locations (markets) 	<ul style="list-style-type: none"> - Future studies could investigate how agile co-creation–DE nexus functions under varying levels of digitisation (e.g. mild, moderate, or high); diverse industry settings (e.g. industrial manufacturing, healthcare, transportation and logistics, financial services, entertainment and leisure, financial services, retail and consumer packed goods); and different geographic or economic contexts (e.g. upper-middle-income and lower-middle-income countries).
<i>Methodological perspectives</i>	<ul style="list-style-type: none"> - Longitudinal study - Large sample quantitative study - Mixed method study - Ethnographic study - Simulation-based study 	<ul style="list-style-type: none"> - To advance theoretical development, future studies should adopt least used research methods such as longitudinal designs, large-sample quantitative

(continued on next page)

Table 5 (continued)

Core paradigms	Key contents	Exemplary questions/ explanation
		analyses, mixed-method studies, ethnographic research and simulation-based modelling.

institutional theory (King et al., 1994) explain how organisations adapt routines, embed agile practices, and respond to institutional pressures. At *macro-level*, concepts like *digital entrepreneurship ecosystems* (Sussan & Acs, 2017) illuminate how regulatory structures, infrastructures, and collective logics shape entrepreneurial agility and opportunity creation.

An integrative approach can uncover how these levels interact. For example, combining *dynamic capability theory* (DCT) with *entrepreneurial network theory* offers a way to study how startups simultaneously mobilise internal sensing and learning capabilities while leveraging external partnerships to co-create digitally enabled value propositions. DCT suggest that startups' sensing, seizing and transforming capabilities are shaped not only by *micro-level* knowledge, skills, and creativity, but also *meso-level* learning routines and *macro-level* ecosystem infrastructures. Matarazzo et al. (2021), for example, adopted DCT to examine how digital transformation changes the customer value creation process of SMEs in an Italian context. The study finds that digital instruments such as social media, mobile apps, chatbots, and big data analytics contribute to innovating the existing business models of SMEs operating in traditional industries by creating new distribution channels and means of creating and delivering value to customer segments, highlighting the *interplay of organisational learning and ecosystem support* in digital transformation.

Likewise, *entrepreneurial network theory* offers a lens for understanding how digital startups build *resource-rich networks* with experts, institutions, investors, and innovation hubs to enact agile co-creation. For example, Beliaeva et al. (2020) used *entrepreneurial network theory* to investigate to what extent and how innovation ecosystem actors contribute to developing DE. The study found that as digitalisation intensifies, digital startups expand their stakeholder networks to include *experts, innovation centres, suppliers, financial institutions, investors, research centres, and industry leaders*. Such networks not only supply resources but also accelerate iterative learning and feedback loops central to agile co-creation. Yet, this theory remains underused in the context of agile co-creation and DE, indicating a valuable avenue for further theoretical integration. Together, these theoretical perspectives can help construct a robust, multilevel foundation for explaining how agile co-creation enables *innovation and opportunity development* in digitally mediated environments, while also addressing DE-specific challenges such as *resource constraints, institutional resistance, and ecosystem complexity* (Felicetti et al., 2024; Kim & Park, 2024; Marcon et al., 2024).

6.3. Boundary conditions and methodological perspectives

While both agile co-creation and DE have garnered increasing scholarly attention, further research is needed to explore how this relationship varies across different *boundary conditions* (Hutter et al., 2023; Paul et al., 2023). Boundary conditions help define the limits of a theory's applicability, showing when and where certain theoretical positions hold true (Jaccard & Jacoby, 2020). To build and refine the theory around the agile co-creation–DE relationship, both conceptual and empirical studies are needed to explore how this connection may vary under different conditions (Dana et al., 2024; Nambisan, 2017). For instance, future research could examine how this nexus functions under varying levels of digitisation (*low, moderate, or high*) and within diverse industry settings that embody different innovation logics, such as *industrial manufacturing, healthcare, logistics, retail, finance, and*

entertainment. Moreover, examining these dynamics across distinct geographic and economic settings, particularly in *upper-middle-income* and *lower-middle-income* countries, would provide valuable counterparts to the predominantly Western-centric and ICT-focused perspectives that currently dominate the literature. Such comparative analyses can reveal whether agile co-creation consistently mitigates DE-specific challenges such as, *uncertainty, network effects, or resource constraints*, or whether its effectiveness is contingent upon *industry infrastructures and institutional environments*.

Methodological advances are also needed. The existing literature is dominated by *conceptual* and *case study* approaches, indicating that the field is still in *exploratory phase* (Dana et al., 2024; Felicetti et al., 2024; Paul et al., 2023). To advance theory development, researchers should adopt underutilised methods, such as *longitudinal studies, large sample-based quantitative analyses, mixed method approaches, ethnographic research, and simulation-based studies*. For instance, longitudinal process tracing of entrepreneurial teams participating in digital accelerators could reveal how agile co-creation capabilities evolve through *iterative learning and resource reconfiguration*. Similarly, multi-country surveys or digital trace data analyses could offer comparative insights into how contextual factors, such as *institutional quality or digital infrastructure*, moderate the relationship between agile co-creation and innovation performance. *Simulation-based studies* could model how agile co-creation influences *network effects* in digital ecosystems, while *ethnographic or action research* could provide deep, situated understanding of how agile co-creation is adapted in *resource constrained or non-ICT sectors*. Finally, empirical work is warranted on how agile co-creation supports the digital transformation of traditional offline firms, where boundary conditions may differ from those of digital-native ventures. Such methodological diversification would also enable empirical testing and refinement of our proposed agile co-creation typology. By examining how *opportunity discovery, rapid learning, strategic agility, and incremental innovation* unfold across different temporal, sectoral, and institutional contexts, future research can validate the typology's theoretical assumptions and uncover potential boundary conditions for agile co-creation in DE.

6.4. Conclusion and limitations

This study contributes to the growing body of research at the intersection of DE and agile co-creation, a field that gained momentum with seminal contributions by Nambisan (2017) and Nambisan et al. (2017). This nexus highlights the strategic integration of stakeholders as co-creators in the development of innovative offerings, enabling firms to achieve sustainable competitive advantage in fast-paced, volatile digital environments (Amit & Han, 2017; Ghezzi & Cavallo, 2020; Kohtamäki et al., 2020; Sjödin et al., 2020). Despite increasing academic interest, the agile co-creation–DE nexus remains under-theorised and fragmented. To address this, we conducted a systematic literature review (SLR) following established methodological protocols (Tranfield et al., 2003), drawing from Scopus, Web of Science, and Google Scholar. Through rigorous screening and synthesis, we analysed 117 peer-reviewed articles spanning strategic management, entrepreneurship, innovation management, and information systems. Based on this review, we developed an integrated framework that demonstrates agile co-creation–DE nexus with three core thematic dimensions, including primary motivations, principal challenges and critical success factors, and anticipated outcomes. For future studies, we highlight the need for a multi-level analytical lens, incorporating the interactions among micro-level entrepreneurial actions, meso-level social and organisational dynamics, and macro-level environmental and regulatory conditions. We further advocate for multilevel theorising, combining individual-level theories (e.g. effectuation, bricolage), organisational level frameworks (e.g. dynamic capabilities), and macro-level ecosystem perspectives. Furthermore, future studies would benefit from longitudinal and mixed-method designs, particularly to unpack dynamic, evolving nature of

agile co-creation process over time. Such approaches are crucial for developing a more robust and generalisable theory of the agile co-creation–DE nexus.

Like any systematic literature review, this study is not without limitations. First, the literature search was restricted to peer-reviewed academic journal articles published in English, using a predefined set of selected keywords. As a result, relevant contributions published in other languages or under alternative conceptual levels may have been excluded. This may particularly affect insights from regions where scholarly work around agile co-creation and DE may be framed differently. Second, the literature search was conducted up to December 2024, meaning that studies submitted or published thereafter are not included in the analysis. Given the increasing scholarly interest in the nexus of agile co-creation and DE, as illustrated by the upward trend in publication volume shown in Fig. 3, this review may not reflect the most recent developments in the field. Future reviews should therefore incorporate more recent studies on theoretical refinements and empirical trends.

CRedit authorship contribution statement

Sardar Wasi Ahmed: Writing – review & editing, Writing – original draft, Visualization, Software, Methodology, Formal analysis, Data curation, Conceptualization. **Ghulam Mustafa:** Writing – review & editing, Supervision, Formal analysis, Conceptualization.

Declaration of generative AI and AI-assisted technologies in the writing process

During the preparation of this work the corresponding author used “ChatGPT” developed by OpenAI in order to improve language and readability. After using this tool, the author(s) reviewed and edited the content as needed and take full responsibility for the content of the publication.

Declaration of competing interest

The authors declare that have no relevant financial or non-financial conflict of interests to disclose.

Data availability

Data will be made available on request.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.digbus.2025.100159>.

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