POLITECNICO DI TORINO

Department of Management and Production Engineering
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Understanding Agile at Scale: A Systematic Literature Review

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Abstract

Large enterprises operate in contexts marked by structural complexity, interdependencies, and constant change. Within such environments, traditional Project Management approaches may encounter limitations in delivering the responsiveness and effective coordination required at the organizational level. Consequently, Agile Project Management has emerged as more suitable approach for dealing with uncertainty and promoting adaptive organizational processes.

While Agile practices are established at the team level, their implementation across large enterprises introduces a wider set of challenges. When extended beyond individual teams, these practices interact with broader organizational dynamics that make their application more elaborate. Coordinating work across multiple units, aligning different ways of operating, and ensuring consistency throughout the enterprise become increasingly demanding, hindering the realization of the intended benefits of Agile approaches. As a result, understanding how Agile methods can be effectively scaled and integrated within such settings remains a relevant topic of investigation.

The present work explores how Agile Project Management techniques can be effectively implemented within large and complex systems. The study employs a Systematic Literature Review (SLR), ensuring a rigorous process for identifying and evaluating the relevant literature. Through targeted searches across selected databases, 27 publications were included and analyzed through a structured descriptive and thematic synthesis. The objective of the research is to explore the key dimensions that influence the adoption of Agile practices at scale and to examine their interaction within complex organizational environments. Instead of focusing on individual frameworks, this analysis adopts a broader perspective to understand how Agile methods are shaped and interpreted within large enterprises.

This study contributes by clarifying the core dimensions involved in the implementation of Agile practices at scale and by interpreting large-scale agility as an organizational phenomenon emerging from their interaction, thus informing future research on effective Agile adoption.

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1 Introduction

This introductory chapter provides the foundation for the study. It situates Agile Project Management within the broader evolution of project management practices (section 1.1), discusses its relevance in the context of large organizations (section 1.2), and outlines the objectives (section 1.3) and structure of the thesis (section 1.4).

1.1 Contextual background

Project management is commonly defined as the application of knowledge, skills, tools, and techniques to project activities to meet project requirements (PMBOK® Guide – Seventh Edition, Project Management Institute, 2021[1]). Projects, in turn, are described as temporary endeavors undertaken to create a unique product, service, or result, and their temporary and unique nature differentiates them from ongoing operational work (PMBOK® Guide – Seventh Edition, Project Management Institute, 2021). Because projects operate under conditions of uncertainty, project management provides structure to plan, execute, and control work by coordinating scope, schedule, cost, quality, resources, and risks. This structured approach enables organizations to transform strategic objectives into concrete outcomes, even when dealing with complex constraints and evolving stakeholder expectations.

The PMBOK® Guide – Seventh Edition (Project Management Institute, 2021) identifies three main development approaches that project teams can adopt depending on the level of uncertainty and the nature of requirements. *"A development approach is the means used to create and evolve the product, service, or result during the project life cycle"* (PMBOK® Guide – Seventh Edition, p. 35, Project Management Institute, 2021). Different industries may use various terms to describe these approaches, but they commonly fall into three categories: predictive, hybrid, and adaptive.

Figure 1 positions these approaches on a spectrum, ranging from the predictive approach at one extreme to the adaptive approach at the opposite extreme.

[1] The PMBOK® Guide (Project Management Body of Knowledge) – Seventh Edition, published by the Project Management Institute (PMI) in 2021, is an internationally recognized standard that provides the foundational concepts, principles, and definitions of modern project management.

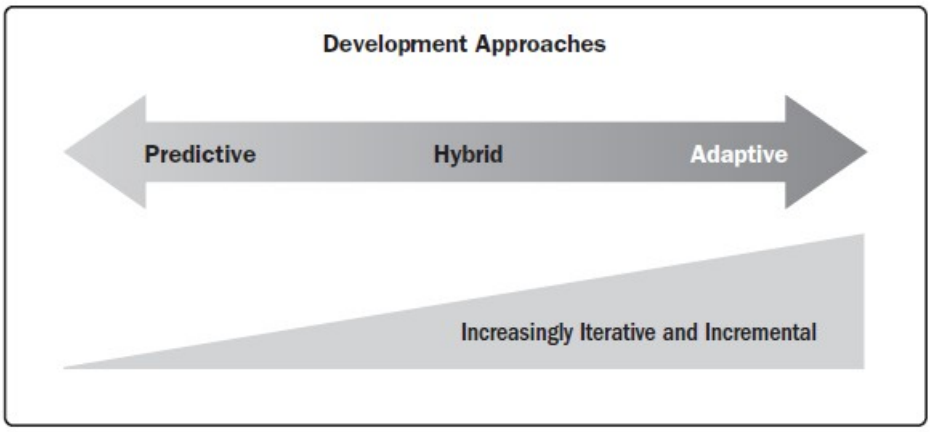

Figure 1: Development Approaches (source: PMBOK® Guide – Seventh Edition, Project Management Institute, 2021)

- **Predictive approach.** A predictive approach is useful when project and product requirements can be clearly defined from the beginning. It relies on extensive upfront planning, stable scope, and well-understood risks, often following a linear ("waterfall") sequence of phases. Because uncertainty can be reduced early, most of the work proceeds according to plans established at project initiation, sometimes supported by templates from similar previous projects.

- **Hybrid approach.** A hybrid development approach combines elements of both predictive and adaptive approaches. It is useful when some aspects of the project can be planned upfront while others involve uncertainty or evolving requirements. Hybrid models often rely on iterative or incremental development (Figure 2) for portions of the work, while other components follow a more linear, predictive structure. This makes the hybrid approach more flexible than a fully predictive model, yet less adaptive than a purely agile one. It is particularly suitable when deliverables can be modularized or developed by different teams using different approaches.

- **Adaptive approach**. An adaptive approach is well-suited for projects with high uncertainty or frequent changes in requirements. A broad vision is defined at the start, while specific needs are progressively refined and adjusted based on stakeholder feedback, environmental shifts, or emerging insights. This approach relies on iterative and incremental development, often through short cycles that enable rapid learning and continuous product evolution. Agile methods fall in this category, using fixed-duration iterations and a prioritized backlog to guide team planning, estimation, and collaborative delivery.

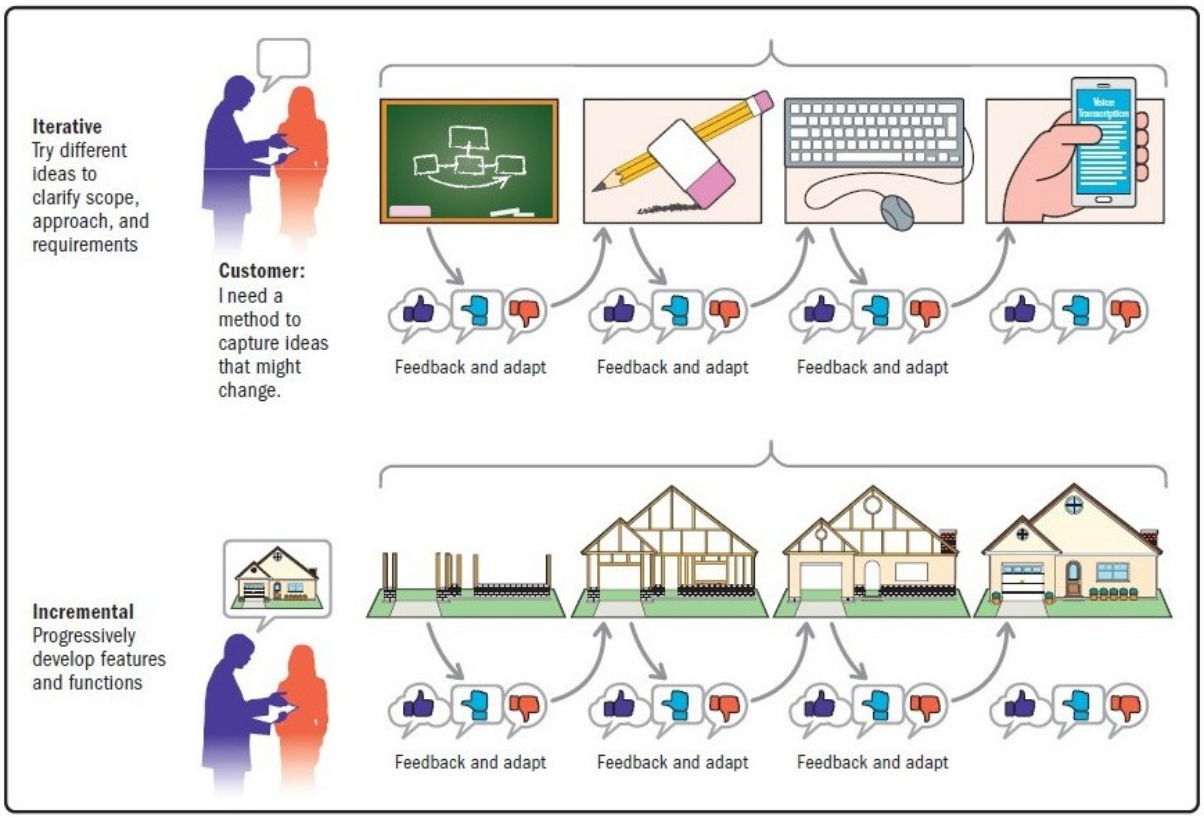

Figure 2: Iterative and Incremental development (source: PMBOK® Guide – Seventh Edition, Project Management Institute, 2021)

As highlighted in the PMBOK® Guide – Seventh Edition (Project Management Institute, 2021), the project management profession has been reshaped by emerging technologies, new approaches, and rapid market changes, which require practitioners to adapt their approaches to effectively deliver value in increasingly dynamic environments. These progresses have broadened the range of viable delivery approaches and reinforced the relevance of methods that enable faster learning, iterative development, and continuous stakeholders engagement.

In this context, Agile Project Management has evolved from a niche methodology for software development into a paradigm for managing projects across various industries. Originally conceived to address the inefficiencies of plan-driven methods, Agile was designed to overcome the rigidity and sequential nature of traditional project management models. At its foundation, the Agile Manifesto (Beck et al., 2001) formalized the movement by emphasizing:

1. **Individuals and interactions** over processes and tools;
2. **Working software** over comprehensive documentation;
3. **Customer collaboration** over contract negotiation;

4. **Responding to change** over following a plan.

These four core values provided the conceptual basis for the twelve principles of Agile development presented below (Figure 3), which translate them into actionable guidelines for project management and teamwork.

1	Our highest priority is to satisfy the customer through the early and continuous delivery of valuable software.	7	Working software is the primary measure of progress.
2	Welcome changing requirements, even late in development. Agile processes harness change for the customer's competitive advantage.	8	Agile processes promote sustainable development. The sponsors, developers, and users should be able to maintain a constant pace indefinitely.
3	Deliver working software frequently, from a couple of weeks to a couple of months, with a preference to the shorter timescale.	9	Continuous attention to technical excellence and good design enhances agility.
4	Business people and developers must work together daily throughout the project.	10	Simplicity–the art of maximizing the amount of work not done–is essential.
5	Build projects around motivated individuals. Give them the environment and support they need, and trust them to get the job done.	11	The best architectures, requirements, and designs emerge from self-organizing teams.
6	The most efficient and effective method of conveying information to and within a development team is face-to-face conversation.	12	At regular intervals, the team reflects on how to become more effective, then tunes and adjusts its behavior accordingly.

Figure 3: The 12 principles of Agile development (source: https://agilealliance.org/)

The principles collectively promote early and continuous delivery, close cooperation between business and development roles, technical excellence, and an adaptive approach to change, shaping Agile as both a management philosophy and a practical framework for continuous improvement. Through its core values and principles, Agile has introduced flexibility, iterative delivery, and customer collaboration, transforming how teams organize their workload and deliver value. The Agile approach includes a variety of methodologies and frameworks that, while differing in their specific practices and areas of focus, share common principles such as rapid iteration, continuous feedback, and adaptability to change.

Agile methods have clear benefits at the team level, such as:

- Improved adaptability, allowing teams to respond rapidly to changing requirements and market conditions through iterative development cycles;
- Higher team engagement and motivation, fostered by autonomy, ownership, and continuous feedback mechanisms;

- Enhanced responsiveness to customer needs, achieved through close and frequent collaboration with stakeholders;
- Increased transparency and communication, supported by shared visibility of project progress and cross-functional interaction;
- Faster decision-making, enabled by decentralized authority and iterative review processes;
- Continuous learning and improvement, promoted by team reflection and open knowledge-sharing to solve problems together.

While Agile practices have proven to be effective at the team level, their implementation within large and complex enterprises has proven more challenging. What functions smoothly within small, self-organized units, characterized by autonomy, informality, and rapid decision-making, often collides with the structural rigidity, layered hierarchies, and procedural formality typical of large organizations (Hobbs and Petit, 2017; Sónta-Drączkowska and Krogulec, 2024). As scale increases, coordination becomes more demanding, governance mechanisms more prescriptive, and cultural alignment is harder to sustain. Within this environment, large-scale initiatives risk failing to preserve the very agility they aim to institutionalize.

The persistence of these difficulties justifies the need for systematic investigation. The growing academic and managerial attention to large-scale Agile frameworks reflects the need for structured yet flexible coordination mechanisms capable of bridging strategy and execution (Ebert and Paasivaara, 2017; Edison et al., 2022). Despite the numerous frameworks and case studies on Agile scaling practices, there remains limited consensus on which dimensions influence successful implementation at scale. As organizations continue to invest in transformation programs, with mixed and often disappointing results, the problem assumes not only a theoretical relevance but also a substantial practical urgency (Carroll et al., 2023, Kalenda et al., 2018).

Clarifying and understanding the nature of the dimensions involved in Agile scaling initiatives represents a key step toward achieving authentic enterprise-level agility.

1.2 Relevance of the study

The relevance of studying large-scale Agile implementation extends beyond methodological refinement, as it concerns the very capacity of organizations to remain competitive and adaptive in increasingly volatile markets.

In the current business landscape, characterized by constant change and evolving customer needs, organizations are under growing pressure to increase their adaptability and responsiveness. These dynamics have encouraged the diffusion of Agile principles past the single project domain, as companies seek approaches capable of coping with uncertainty and supporting continuous learning within complex organizational settings (Camara et al., 2024; Hron and Obwegeser, 2022; de Oliveira Santos and Monteiro de Carvalho, 2022). In response, the strategic importance of enterprise agility has intensified. Organizations are now expected to be flexible in product development as well as in strategic planning, portfolio management, and corporate governance (de Oliveira Santos et al., 2025). Enterprise agility has become a key determinant of organizational resilience and long-term performance, requiring companies to redesign their operating models to support innovation, cross-functional collaboration and continuous learning (Hron and Obwegeser, 2022; Hutter et al., 2025).

Agile Project Management has become a central pillar of this transformation, promising faster delivery, enhanced responsiveness, and higher employee engagement (Putta et al., 2024). Nevertheless, the failure of large organizations to realize these outcomes demonstrates that the adoption of Agile at scale is neither straightforward nor guaranteed (Conboy and Carroll, 2019).

From a practical standpoint, this issue holds major implications for executives, transformation leads, and policymakers. Global enterprises are investing heavily in large-scale transformation programs, which often involve multi-year initiatives and substantial financial and human resources (KPMG, 2024). Within this broader landscape, Agile transformation has become a key approach for redesigning ways of working and enabling faster, cross-functional collaboration. Despite these efforts, evidence indicates that many transformations plateau after initial enthusiasm, constrained by structural inertia and fragmented leadership support (Carroll et al., 2023). Unsuccessful transformation efforts can entail organizational repercussions, going beyond financial costs, including uncertainty, change fatigue, and an erosion of employee trust.

More concretely, the inability to scale Agile effectively undermines strategic coherence and value realization. When teams adopt Agile practices in isolation, enterprises risk generating local improvements that do not translate into system-wide performance gains. The lack of coordination between Agile and traditional governance mechanisms often leads to conflicting decision-making structures, duplicated work, and loss of strategic alignment (Kreye et al., 2025; Wessel et al., 2022).

Beyond its managerial relevance, the phenomenon also carries substantial theoretical significance. While Agile principles are well established at the team level, their translation into enterprise systems remains conceptually fragmented (Edison et al., 2022). Existing models tend to emphasize structures and processes, often overlooking the behavioral, cultural, and strategic dimensions that determine whether agility endures over time. Consequently, there is a pressing need for studies to bridge these perspectives and offer a comprehensive understanding of enterprise agility as a dynamic organizational capability (Hutter et al., 2025).

In sum, the problem importance involves both theoretical and practical aspects. On the one hand, researchers aim to clarify the mechanisms that enable agility to scale across organizational boundaries, contributing to the refinement of management and organizational theory. On the other hand, practitioners require actionable insights to design transformation strategies that achieve lasting impact rather than temporary compliance. Bridging these perspectives is crucial to ensure that Agile Project Management evolves from an operational technique into a strategic capability for enterprise resilience and innovation.

1.3 Objectives

The purpose of this study is to increase the academic and managerial understanding of how Agile Project Management can be effectively applied within large and complex organizational environments. Rather than focusing on individual practices or frameworks, the research seeks to identify and explore the key aspects that shape how organizations translate Agile principles into sustained enterprise-level agility. Accordingly, the study pursues the following objectives:

- To identify and analyze recurring patterns and areas of influence in large-scale Agile transformations;
- To highlight the persistent challenges and underexplored areas that limit the consolidation of agility;

- To provide a conceptual foundation that supports both scholars and practitioners in designing more coherent and sustainable Agile transformation strategies.

By addressing these objectives, the thesis aims to contribute to a more integrated understanding of enterprise agility, bridging the gap between theoretical perspectives and enterprise-level practice. The methodological approach adopted to achieve these objectives is presented in the following chapters.

1.4 Structure

This thesis is organized into the following chapters, each contributing to a progressive understanding of the research topic:

- Chapter 2 – Theoretical background: outlines the key concepts on Agile scaling methods, organizational capabilities, and the characteristics of large enterprises, providing the conceptual basis for the study.
- Chapter 3 – Research methodology: presents the methodological approach, detailing the Systematic Literature Review process, search strategy, inclusion criteria, and synthesis framework adopted.
- Chapter 4 – Results: reports the findings of the descriptive and thematic synthesis, organizing evidence into five thematic categories that capture the main dimensions influencing large-scale Agile implementation.
- Chapter 5 – Discussion: interprets the results, discussing their theoretical and practical implications while positioning them within the broader field of Agile transformation.
- Chapter 6 – Conclusions: summarizes the contributions of the study, clarifies its delimitations and limitations, and suggests directions for future research on sustaining agility at scale.

2 Theoretical background

Building on the theoretical and contextual foundations outlined in the first chapter, the present section deepens the conceptual understanding of how Agile principles are interpreted and executed beyond the single-team level.

This chapter evaluates the main frameworks designed to scale Agile practices across multiple teams (subsection 2.1.1 and subsection 2.1.2), as well as other Agile-based approaches that have influenced discussions on organizational agility (subsection 2.1.3) [2], while also clarifying the notion of organizational capabilities as used throughout this study (section 2.2). Section 2.3 instead covers the concept of large-scale organization and its environment.

By connecting practical approaches used in large organizations with theoretical constructs related to coordination, structure, and dynamic capabilities, the present chapter establishes the background necessary to interpret the empirical findings presented in later sections.

2.1 Scaling frameworks

As Agile practices spread beyond software development, organizations faced the challenge of maintaining coordination, alignment, and strategic coherence across multiple teams and business units. This led to the emergence of scaling frameworks, formalized structures designed to extend Agile principles to the enterprise level while preserving the responsiveness and customer focus inherent to Agile(Edison et al., 2022; Stan et al., 2025).

Although they differ in various aspects, these frameworks share a common purpose: to reconcile flexibility and governance in complex organizational settings (Kreye et al., 2025; Wessel et al., 2022). They typically address three objectives (Edison et al., 2022; Mayer and Recker, 2024):

- Alignment, ensuring that teams work toward shared strategic goals;
- Coordination, managing interdependencies and shared backlogs;
- Governance, ensuring visibility and accountability across the organization.

The following subsections review these approaches, highlighting their core structures, coordination mechanisms, and the ways in which they support Agile work across multiple teams.

[2] Rather than assuming that any single framework represents a best practice for scaling Agile, this thesis treats frameworks as coordination mechanisms whose effectiveness depends on organizational context and underlying capabilities.

2.1.1 Scaled Agile Framework (SAFe)

The description in this section draws on the official SAFe® 6.0 documentation (Scaled Agile Inc., 2023)

The Scaled Agile Framework (SAFe) is one of the most widely adopted approaches for extending Agile practices across large and complex organizations. Originally introduced by Leffingwell (2011), it has been formalized and continuously updated by Scaled Agile Inc.[3], as a configurable framework that combines Lean, Agile, and systems thinking to coordinate multiple teams working on shared value streams. SAFe explicitly targets enterprise concerns, including portfolio alignment, multi-team coordination, and the integration of its practices with existing governance systems, positioning itself as a comprehensive model for business agility at scale.

At its core, SAFe focuses on three main challenges that typically emerge when organizations attempt to scale Agile practices beyond isolated teams:

- Maintaining strategic alignment, ensuring that the work of multiple teams remains connected to the enterprise's broader business objectives;
- Managing inter-team dependencies, especially when products span multiple components, platforms, or organizational units;
- Balancing flexibility and control, so that iterative delivery and experimentation can coexist with regulatory, compliance, or risk-management requirements.

To support these objectives, SAFe provides a layered organizational structure articulated into four levels, each responsible for coordinating a specific set of activities. Depending on the configuration adopted, these levels include:

- Team level: cross-functional Agile teams work using Scrum or Kanban and deliver value in short, iterative cycles, focusing on incremental delivery, technical quality, and direct collaboration.
- Program level: at this level, multiple Agile teams are brought together within a stable "team of teams" called the Agile Release Train (ART). The ART operates on a shared

[3] Scaled Agile Inc. is the organization responsible for developing, maintaining, and updating the Scaled Agile Framework (SAFe). The official documentation of the framework, including its roles, levels, and operating principles, is published through the Scaled Agile Framework website (https://www.scaledagileframework.com).

rhythm, delivering value every 8 to 12 weeks and supporting coordination, dependency management, and integrated delivery across teams.

- Large Solution level: multiple ARTs and suppliers are coordinated to build large and complex systems requiring extensive architectural alignment and multi-team integration.
- Portfolio level: execution is connected to strategic themes, investment decisions, and enterprise value streams, ensuring alignment between Agile delivery activities and organizational strategy.

In addition to the structural design, SAFe defines a set of pivotal roles and practices intended to ensure transparency and coordination. Typical roles include:

- Product Owner: prioritizes and refines the team backlog, acting as the bridge between the Agile team and business stakeholders to ensure alignment with customer needs.
- Scrum Master: facilitates collaboration and Agile ceremonies, removes obstacles, and supports continuous improvement while safeguarding adherence to Agile core principles.
- Release Train Engineer: coordinates activities across teams within the ART and facilitates major synchronization events.
- System Architect: maintains the architectural vision at system or solution level, ensuring technical coherence and long-term sustainability.
- Business Owner: represents the business perspective within the ART, validating priorities and ensuring that value creation remains aligned with the strategic objectives of the company.

These roles reflect SAFe's attempt at preserving Agile responsibilities (such as the Product Owner and Scrum Master) while introducing additional leadership positions to address system-level concerns and portfolio governance. SAFe also defines a set of core events and practices that put its principles into practice:

- The Program Increment (PI) Planning, which is a large planning session where all teams define common objectives, surface dependencies, and agree on a coordinated plan for the upcoming increment;

- Regular system demos, where teams review the integrated product work together, and periodic retrospectives help maintain transparency and continuous learning;
- Continuous delivery practices, which integrate development and operations to accelerate and stabilize delivery, support faster and more reliable value delivery and reinforce the connection between organizational coordination and technical excellence.

Figure 4 offers a visual representation of the roles, activities and key components of the framework.

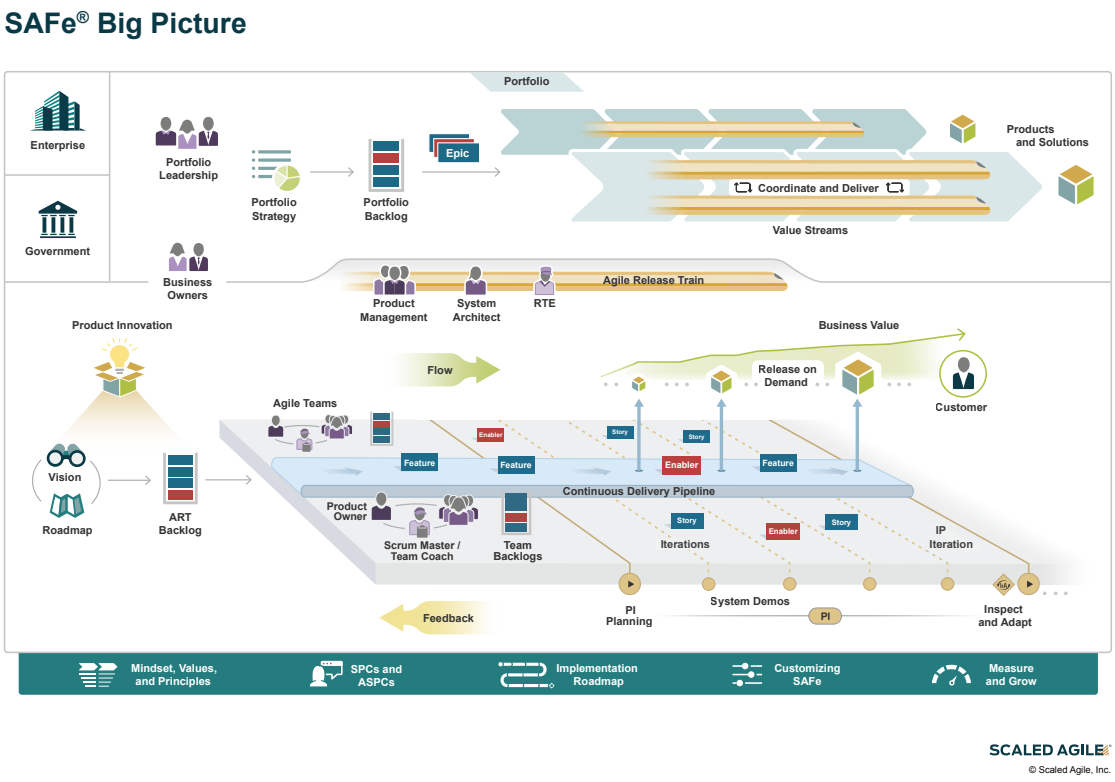

Figure 4: SAFE® Big Picture (source: Scaled Agile Framework website)

Practitioner reports and empirical studies often highlight improved transparency, better cross-unit coordination, and greater predictability as typical outcomes of SAFe adoption, especially in environments requiring structured collaboration across multiple teams. While results vary across contexts, organizations that apply the framework consistently tend to report smoother integration cycles and delivery processes that are more aligned with company's goals.

Overall, SAFe provides an approach for scaling Agile by combining synchronized planning, formalized roles, and multi-level coordination mechanisms, offering organizations a way to manage complexity while maintaining alignment and flow at scale.

2.1.2 Large-Scale Scrum (LeSS)

The description in this section draws on the official LeSS Framework documentation (LeSS Company, 2023).[4]

Large-Scale Scrum (LeSS) is a minimalist Agile scaling framework designed to extend Scrum to multiple teams working together on a single product. Developed by Craig Larman and Bas Vodde, LeSS maintains the fundamental simplicity and empiricism of Scrum, while introducing the minimum number of additional elements required to coordinate multiple teams.

Scrum provides the conceptual foundation for LeSS. In its standard form, Scrum organizes work around a cross-functional unit that delivers a potentially shippable increment within short, fixed-length Sprints, which are time-boxed iterations that guide planning and delivery. Its structure is intentionally minimal, with three roles:

- Product Owner: responsible for maximizing product value by setting priorities and clarifying what needs to be developed.
- Scrum Master: facilitates Scrum practices, removes impediments, and supports the team in improving collaboration and delivery processes.
- Developers: cross-functional team members who collectively plan, build, test, and deliver the product increment during the Sprint.

While some role names are shared with SAFe, in Scrum and LeSS they operate with a narrower scope and less hierarchical structure, reflecting the frameworks' emphasis on simplicity and team autonomy. Alongside these roles, Scrum relies on a small set of recurring events that structure collaboration and delivery.

- Sprint Planning: defines the Sprint Goal and selects the work to be completed during the Sprint.
- Daily Scrum: a brief daily meeting to evluate progress and adjust the plan.

[4] LeSS Company is the organization founded by Craig Larman and Bas Vodde to maintain and evolve the Large-Scale Scrum (LeSS) framework. The related official documentation is available at https://less.works.

- Sprint Review: a collaborative session with stakeholders to assess the increment and gather feedback.
- Sprint Retrospective: a reflection event where the team identifies process and collaboration improvements.

In addition to the events, Scrum specifies three key elements that support transparency and planning:

- Product Backlog: the ordered list of all the work needed to improve the product.
- Sprint Backlog: the set of Product Backlog items selected for the Sprint, together with the team's delivery plan.
- Increment: the usable product output created during the Sprint that meets the Definition of Done (DoD, a common set of quality criteria for completed work).

The framework is rooted in empirical process control, emphasizing transparency, frequent inspection, and continuous adaptation. While it is effective for single-team environments, organizations often encounter difficulties when attempting to extend Scrum to complex products requiring the collaboration of many teams. LeSS addresses this challenge by scaling Scrum horizontally, while maintaining its original principles.

At its core, LeSS applies one Product Owner, one Product Backlog, one shared Definition of Done, and one common Sprint across multiple teams. Inter-team coordination is achieved not by adding management layers, but by synchronizing Sprints and encouraging direct collaboration. Teams operate as feature teams capable of delivering end-to-end value, minimizing handovers and reducing dependencies on specialized component groups. This allows LeSS to support whole-product optimization rather than local optimization of individual components or subsystems.

The framework is defined in two configurations. The first, known simply as LeSS, supports between two and eight teams working on a single product. This configuration remains closely aligned with Scrum, adding only a limited set of cross-team mechanisms. The second configuration, LeSS Huge, is intended for the development of products where more than eight teams are involved. In LeSS Huge, the product is divided into Requirement Areas, which are logical

groupings of related requirements designed to make large-scale development more manageable. Each area is supported by several feature teams and guided by an Area Product Owner. Despite this additional structuring, LeSS Huge preserves the principle of a single overarching Product Owner and a unified product vision.

To support coordination while maintaining the lightweight nature of Scrum, LeSS extends some Scrum events to the multi-team context. Examples include:

- Overall Product Backlog Refinement (PBR): a collaborative process in which multiple teams cooperate to refine high-level items, anticipate dependencies, and align on product scope;
- Two-step Sprint Planning: this planning metho is used to establish shared goals, identify cross-team interactions, and distribute work from the common Product Backlog;
- Joint Sprint Review: a session in which all teams present the integrated increment to stakeholders;
- Overall Retrospective: it is a meeting dedicated to identifying systemic issues and improvement opportunities that span beyond individual teams.

These events execute one of core principles of LeSS: transparency and learning improve when teams coordinate directly, rather than through intermediary roles or structures. Figure 5 illustrates a high-level overview of the LeSS framework.

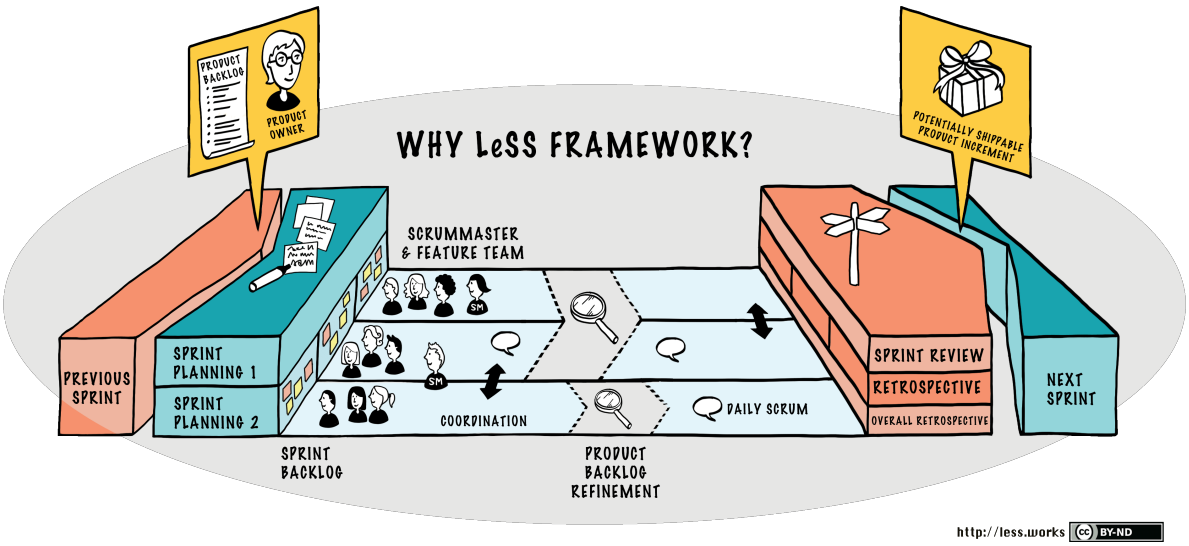

Figure 5: LeSS Framework (source: Large Scale Scrum website)

Organizations that adopt LeSS often report clearer collaboration, faster feedback cycles, and a stronger whole-product focus. The reduced coordination overhead and simpler structures associated with LeSS tend to support smoother delivery and more coherent outcomes across teams.

In summary, LeSS is grounded in the idea that scaling should remove complexity rather than add it, embodying a lean, "more with LeSS" approach that preserves Scrum's simplicity even at higher organizational scales.

2.1.3 Other approaches

Beyond SAFe and LeSS, other approaches are often referenced in the literature when examining how organizations attempt to scale Agile practices. Although these approaches differ in terms of formalization, scope, and intended use, they offer valuable insights into the diversity of strategies adopted by companies to coordinate multiple teams, structure collaboration, and enhance organizational agility. Three approaches often addressed in this context include:

- **Spotify Model:** The Spotify Model originated from a series of internal engineering culture articles published by Kniberg and Ivarsson (2012). It rapidly gained influence as an example of a highly autonomous and flexible organizational structure. Crucially, however, Spotify's authors emphasize that the model was never intended to be a formal scaling framework, but rather a description of evolving organizational experiments of the company (Kniberg and Ivarsson, 2012).
  The model is built around four structural elements (Figure 6):
  - Squads: autonomous, cross-functional teams resembling Scrum teams, each owning a specific product area;
  - Tribes: collections of squads operating in related domains, coordinated with minimal oversight by a Tribe Lead;
  - Chapters: functional groupings that support knowledge sharing across squads;
  - Guilds: informal groups that promote learning and alignment across the entire organization.

The Spotify Model emphasizes culture over process, prioritizing autonomy, trust, and experimentation. Its relevance to Agile at scale lies in illustrating how large organizations can use lightweight structures to balance alignment and autonomy (Kniberg and Ivarsson, 2012).

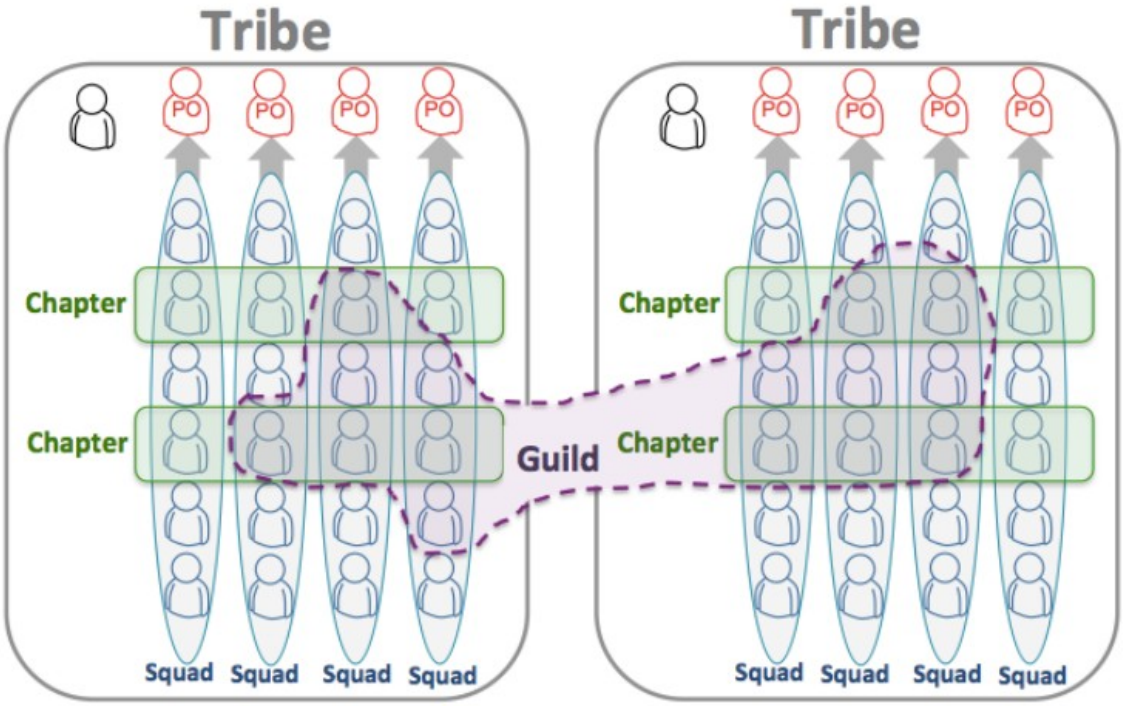

Figure 6: Structural elements of the Spotify Model (source: Kniberg and Ivarsson, 2012)

- **Nexus:** Nexus is a Scrum-based scaling framework designed to coordinate three to nine teams working on a single product (Schwaber and Scrum.org, 2021[5]). The model is structured and it specifies the minimum extensions needed to scale Scrum effectively.
  Its key elements include:
  - Nexus Integration Team (NIT): the team accountable for ensuring that the integrated increment meets quality and usability standards;
  - Scaled refinement: cross-team refinement sessions that anticipate dependencies and integration issues;
  - Nexus Sprint events: scaled versions of Sprint Planning, Daily Scrums, Sprint Review, and Sprint Retrospective;

[5] Nexus was created by Ken Schwaber in collaboration with Scrum.org (https://www.scrum.org), and both continue to maintain and update the framework (https://www.scrum.org/resources/online-nexus-guide).

- Integrated Increment: a fully integrated, usable product increment produced each Sprint.

Nexus retains the minimalism characteristic of Scrum while offering structure for dependency management and multi-team integration. It is particularly suitable for organizations seeking to scale Scrum without adopting heavyweight governance mechanisms. Figure 7 shows the structure of the Nexus framework.

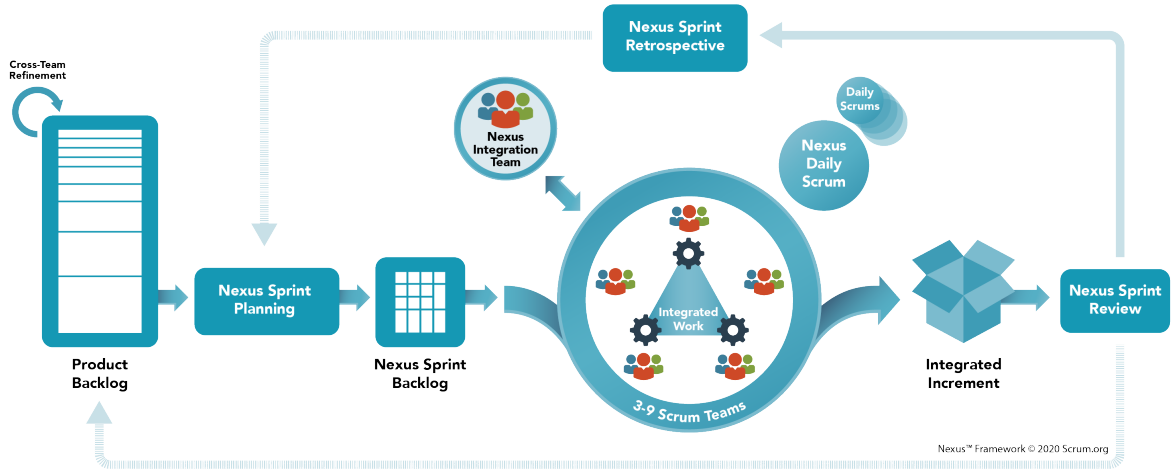

Figure 7: The Nexus Framework (source: Scrum.org)

- **Disciplined Agile Delivery:** Disciplined Agile Delivery (DAD), introduced by Ambler and Lines (2012), is part of the broader Disciplined Agile (DA) toolkit now maintained by Project Management Institute. It is a hybrid, end-to-end delivery framework designed to guide teams across the full product development lifecycle (Ambler and Lines, 2012). DAD's distinctive features include:

  - Hybrid foundation: integrates Agile and Lean practices from multiple methods, combining iterative, flow-based, and architecture-focused approaches into one coherent guidance model;
  - Goal-driven decision model: teams choose their "way of working" (WoW) by adopting context-specific strategies;
  - Lifecycle awareness: a key capability of the framework that allows teams to select the most effective approach for developing the product;

- Expanded roles: such as Architecture Owner and Team Lead, supporting technical alignment and governance.

Although not a scaling framework in the strict sense, DAD remains highly relevant to Agile at scale. It provides structured guidance on coordination, architecture, and governance across teams, making it a useful reference in multi-team Agile environments where hybrid practices are necessary.

Despite not being formal scaling frameworks in the strict sense, the Spotify Model and DAD remain relevant to the theoretical background of this the thesis because of their role in shaping contemporary understandings of Agile in large organizations. Both approaches provide insights on how structures, coordination mechanisms, and cultural enablers influence Agile transformation beyond the team level. Their visibility in the literature, transformation programs, and empirical studies further reinforces their impact on how enterprises conceptualize and implement agility.

Taken together with Nexus, these approaches illustrate the breadth of organizational solutions adopted to support multi-team coordination and Agile ways of working. This diversity complements the more rule-based nature of SAFe and the minimalist philosophy of LeSS, offering a richer view of the different paths through which organizations attempt to achieve agility at scale. Their analysis contributes to a detailed understanding of the conditions and mechanisms that influence successful Agile implementation across complex enterprise environments.

2.2 Capabilities

The concept of organizational capability provides a useful lens for interpreting how large organizations adopt and sustain Agile practices beyond the team level. In its broadest definition, an organizational capability refers to the collective ability of an organization to coordinate activities, mobilize resources, and consistently achieve the desired outcomes. The PMBOK® Guide – Seventh Edition (Project Management Institute, 2021) describes organizational capability as a property emerging from the interaction of structures, people, and processes, shaping how an organization executes work and responds to change. Although the concept of capability is widely used in management studies, not all capabilities operate at the same level.

Strategic literature distinguishes between:

- Operational capabilities, which support routine execution of tasks and processes;
- Dynamic capabilities, which enable the organization to sense changes, seize opportunities, and reconfigure structures to maintain long-term adaptability (Hutter et al., 2025; Teece, 2007).

This distinction reflects both a different organizational functions and different mechanisms of action. Operational capabilities are rooted in established routines and standardized processes that ensure consistency, efficiency, and reliability in day-to-day execution. These capabilities tend to evolve incrementally, improving through repetition and refinement rather than through radical change. Dynamic capabilities, instead, emerge from processes such as learning, knowledge recombination, and deliberate experimentation. They enable the organization to question existing routines and to adjust its structures or resource configurations when circumstances require it.

When applied to large-scale Agile initiatives, organizational capabilities help companies coordinate ongoing delivery work, while the dynamic ones determine whether Agile practices can be integrated, sustained, and evolved over time. Rather than focusing on isolated methods, the dynamic capabilities perspective emphasizes how organizations learn, adapt, and transform their ways of working, a viewpoint that aligns with empirical observations from large-scale Agile transformations.

The PMBOK® Guide underlines this view when stating that transitioning from predictive to adaptive approaches *"entails shifting the mindset starting at the executive level throughout the organization"*(PMBOK® Guide – Seventh Edition, p. 41, Project Management Institute, 2021), requiring adjustments to policies, reporting structures, and ways of working. These adaptations are the manifestation of deeper organizational capabilities, which are skills, routines and cultural attributes that companies must cultivate to absorb new methods and sustain agility over time.

In this sense, developing organizational capabilities becomes essential for transitioning from isolated Agile practices to sustained enterprise agility. As later chapters show, many of the elements related to successful Agile-at-scale adoption can be interpreted as manifestations of these dynamic capabilities.

2.3 The context of large enterprises

Large enterprises represent organizational systems of considerable complexity, operating with extensive workforces, multiple business units, and diversified product or geographic portfolios. Although threshold definitions vary across institutions, large enterprises generally include organizations that coordinate thousands of employees, manage multi-layered governance structures, and operate through numerous interdependent value streams. Their scale and differentiation shape how work is organized and how change is absorbed (Albert, 2024; Larsen et al., 2023). These dynamics, and the coordination mechanisms they require, are explained in contemporary organizational design literature (Burton and Obel, 2018).

As organizations grow, structural differentiation increases. Departments, domains, and professional branches become more specialized, requiring mechanisms to integrate their work. Classic organizational theory shows that this expansion triggers a parallel need for integration mechanisms, which often take the form of:

- Formal hierarchies and vertical reporting relationships;
- Standardized processes, procedures and documentation flows;
- Structured planning and reporting systems;
- Cross-functional liaison roles, committees or steering groups.

In parallel, corporations typically operate under regulatory and environmental complexity. Sectors such as finance, utilities, energy, and telecommunications face stringent compliance requirements and long investment cycles. These pressures reinforce the need for predictability and control, leading to governance systems characterized by (Albert, 2024):

- Multilayered approval processes;
- Risk-averse decision-making;
- Detailed documentation and audit trails;
- Portfolio-level coordination across projects and programs.

Governance structures expand as organizations scale, shaping how decisions are made, how information flows across layers and how priorities are balanced at portfolio level (PMBOK®

Guide – Seventh Edition, Project Management Institute, 2021). While these mechanisms ensure accountability and risk management, they often extend decision-making cycles and slow organizational responsiveness. Big companies also depend heavily on multi-team, cross-functional collaboration, as value delivery extends across numerous departments and technical domains. Typical characteristics include:

- Interdependent workflows across development, operations, compliance, marketing, and finance;
- Shared architectural components or systems;
- Distributed ownership of deliverables;
- Increased needs for coordination, communication, and alignment.

Cultural dynamics further shape organizational behavior. In large enterprises, these factors often manifest in well-established professional identities, routines that create path dependencies, risk-averse mindsets shaped by prior successes, and multiple layers of leadership that reinforce stability and formal processes. While such patterns support reliable execution, they can also produce organizational inertia, making it more difficult to introduce and embed new practices.

Overall, large enterprises are challenging environments for the adoption of Agile ways of working. Their structure support control, risk management, and coordination, but it can also constrain flexibility and slow adaptation. Understanding these dynamics is therefore needed for interpreting how Agile practices are introduced, scaled, and sustained within large organizational systems.

2.4 Concluding remarks

The concepts introduced in this chapter offer a structured lens for understanding how Agile practices are interpreted and implemented within large enterprises, highlighting the complexity of Agile adoption in such contexts. By clarifying the main scaling frameworks, the role of organizational capabilities and the characteristics of large enterprises, it provides the theoretical foundation for reading and understanding the rest of the thesis. These elements help contextualize the conditions that emerge from the systematic review and explain why certain aspects consistently influence Agile implementation at scale.

3 Research methodology

To conduct this study, the Systematic Literature Review method was selected as the research approach. From this point onward, the Systematic Literature Review method will be referred to by its acronym SLR.

The SLR approach was considered appropriate as it allows for a structured and unbiased synthesis of existing academic evidence, enabling the detection of common patterns and conditions across diverse studies on large-scale Agile implementation.

This chapter focuses on the review process, its description, and how it has been applied within the context of this specific work.

3.1 The Systematic Literature Review method

An SLR is an academic method with the objective of identifying and evaluating all relevant literature on a topic to draw conclusions about the question under consideration. A formal methodological approach is adopted to minimize distortions resulting from an excessively restrictive selection of the available literature and to enhance the reliability of the sources considered. An important aspect in this regard is the prior definition of a specific research objective, alongside established inclusion and exclusion criteria before the study is conducted.

The PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) framework was taken as a guiding reference. Specifically, the PRISMA 2020 framework (Page et al., 2021), an updated version of the original 2009 PRISMA statement (Moher et al., 2009), informed the review process. The framework was adapted to the context and requirements of this work, in combination with the thesis template and recommendations provided by the supervisors.

PRISMA 2020 is a reporting guideline which offers a standardized structure for reporting systematic reviews to ensure accuracy, transparency and completeness. It offers a set of tools, such as the PRISMA 2020 flow diagram, that facilitate the review process.

The following sections will focus on the analysis of the subsequent steps followed within the context of this specific SLR.

3.2 Formulation of the research question

To perform an SLR, it is necessary to formulate a clear and well-defined research question (RQ). It must be analyzed if the question has been addressed enough by previous studies to allow an SLR, otherwise it will not be possible to gather enough data. In the latter case, the research question should be adjusted to broaden the scope, thereby facilitating the data extraction process.

Building on the objectives defined in the Introduction chapter (section 1.3) and on the gaps identified in the existing literature, this thesis aims to explore the dimensions that affect the successful implementation of Agile Project Management practices at scale. To address this need, the study formulates the following research question:

RQ: *What dimensions influence the successful implementation of Agile Project Management techniques in large-scale enterprises?*

Following a preliminary search across several online databases, it was determined that a sufficient body of literature exists to address the question through an SLR.

3.3 Selection of research sources

The identification and selection of appropriate information sources represents a significant step in the SLR process. The two most important dimensions to consider when evaluating a database are the quality of the works it offers and the volume of publications centered around the research topic.

Based on these parameters, SageJournals and Pico Polito were selected as the main databases for the review. The sources were consulted during the period from July 2025 and September 2025. It should be noted that the author's personal academic account at the Politecnico di Torino was leveraged to access some of the articles leveraged as information sources.

3.4 Identification of relevant work

Once the research sources have been selected, the relevant work on the question under analysis must be identified. To go through this phase in a practical yet thorough manner, it is common practice to insert research-related key words into the search bar of the selected websites.

For what concerns this SLR, the following key words were used:

- Agile Project Management AND Large organizations;
- Large Scale Scrum (LeSS);
- Scaled Agile Framework (SAFe).

In the first item, the operator “AND” indicates that the search was conducted using the combination of the terms “Agile Project Management” and “Large organizations” to filter the results within the databases. Besides "Large organizations", similar and related terms such as "Large enterprises", "Large-scale organizations" were also used.

3.5 Definition of inclusion criteria

The inclusion criteria of an SLR are rules that determine whether or not a study will be included in the final dataset. These criteria, defined after the research question (section 3.2), are needed to select the relevant articles and to ensure the consistency and replicability of the review process. Through a precise delineation of the scope of eligible studies, these criteria serve to minimize selection bias and strengthen the overall validity of the findings.

To make a first selection of the file under analysis, the key words highlighted in section 3.4 were leveraged. To further refine this part of the process, only the studies that met the following criteria were selected:

- Year of publication: between 2015 and 2025;
- Document type: Article, Research, Review;
- Language: English, Italian;
- Field: Engineering, Management, Business.

After this initial filtering, the following criteria were applied to determine whether each publication should be included in or excluded from the review:

- Focus on large-scale Agile implementation;
- Analysis of facets influencing Agile adoption;
- Empirical or theoretical foundation;

- Relevance to large or complex organizational contexts.

The next section explains in detail the process that led to the identification of the studies selected for analysis and data extraction.

3.6 Selection process

The objective of this phase is to ensure that only publications that are truly relevant to the SLR are considered. Among its tools, the PRISMA 2020 framework (Page et al., 2021) provides the PRISMA 2020 flow diagram, which serves as a useful template to illustrate and summarize the study selection process.

Within the scope of this thesis, the selection process was carried out by one reviewer. Starting from the top of the diagram, the records previously identified through the keywords listed in section 3.4 were further filtered based on their title, excluding those that clearly did not address relevant topics. In the subsequent screening phase, records were excluded on the basis of their abstract or, when necessary, after a full-text review, if they did not meet the inclusion criteria of section 3.5.

In conclusion, a total of 27 studies were included in the review, as shown in Figure 8.

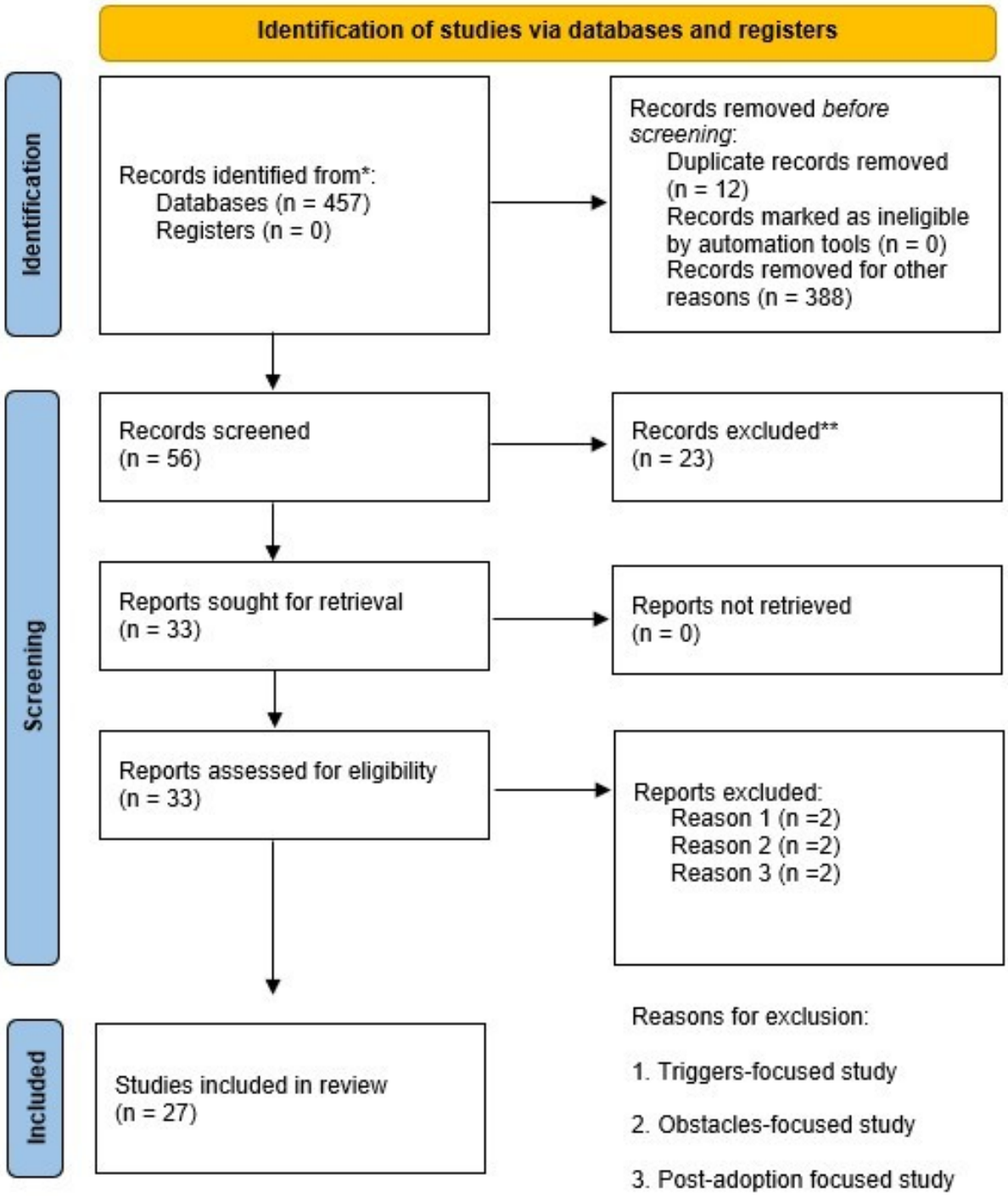

Figure 8: PRISMA 2020 flow diagram

3.7 Excluded studies

The studies excluded from the review are presented in a dedicated section of the Bibliography. Each study was assigned an identification number (ID) to allow for a more readable formatting of Table 1. The IDs were assigned according to the alphabetical order of the authors.

Exclusion criterion	Description	ID
Triggers-focused study	The study focuses on adoption triggers without examining the broader aspects that enable or constrain large-scale Agile implementation	44; 47
Obstacles-focused study	The study examines high-level challenges and barriers related to Agile adoption but does not analyze the elements influencing its implementation at scale	43; 48
Post-adoption focused study	The study investigates post-adoption practices or operational dynamics in organizations that have already implemented Agile, without examining the dimensions that shape the adoption process	45; 46

Table 1: Excluded studies and corresponding exclusion criterion

3.8 Data extraction and synthesis

The data extraction and synthesis phase is conducted to systematically collect and organize information from the selected papers. To allow for a more detailed analysis,the outcomes of this phase will be discussed in a separate chapter. The following sections seek to describe the method used for data extraction (subsection 3.8.1) and synthesis (subsection 3.8.2).

3.8.1 Data Extraction Process

To guarantee consistency across the analyzed sources, a structured data extraction template is defined. For what concerns this SLR, the following data were collected for each study:

- Author;
- Year of publication;
- Agile approach analyzed;

- Study context, which indicates the empirical industry or theoretical nature of the study;
- Key findings, including recurring patterns, barriers, and enabling factors for large-scale Agile implementation.

The collected data were systematically reported in Word and Excel files to facilitate the subsequent analyses.

3.8.2 Data synthesis

After data are extracted, the synthesis process is used to identify patterns and relationships among the articles. For this phase, a two-step synthesis approach was applied, consisting of a descriptive and a thematic phase, as outlined below:

1. Descriptive synthesis: This stage offers an aggregated view of the studies included in the final dataset. It emphasizes the key features and common patterns of the reviewed publications by employing visual summaries to illustrate trends and distribution.
   Within the context of this SLR, the created graphs are designed to consolidate the following information:
   - The temporal distribution of the studies (Figure 9);
   - The analysis of approach concentration and diffusion in the select literature (Figure 10);
   - The distribution by study context (Figure 11).

   All of the aforementioned analyses are based on the information summarized in Table 2.
2. Thematic synthesis: During this phase, the recurring patterns and connections across the selected documents are examined. The evidence is grouped into distinct categories, reflecting the main factors that influence the adoption of Agile Project Management at scale, as it is the focus of the study.
   The key components of this synthesis are the following:
   - The description of the identified categories (subsection 4.2.1);
   - The analysis of their concentration and diffusion across the studies (Figure 12);
   - The presence of the categories across individual studies (Table 3);
   - A summary table consolidating the results of the synthesis (Table 4).

This two-step synthesis ensured a systematic integration of evidence, revealing the key dimensions shaping successful large-scale Agile implementation. As noted above, the findings of this part of the process are presented in a dedicated chapter (Chapter 4) to enable for a comprehensive examination. Specifically:

- Section 4.1 presents the outcomes of the Descriptive synthesis;
- Section 4.2 details the results of the Thematic synthesis.

3.9 Assessment of the risk of bias

The risk of bias evaluation is done to appraise potential distortions that may arise from publication-related factors or from inconsistencies across the analyzed studies. The goal of this phase is to verify that the conclusions of the review are drawn from an accurate and balanced sample of available evidence.

3.9.1 Publication bias

Publication bias focuses on the tendency for studies with positive or significant findings to be published more frequently than those with neutral or negative results. This trend can lead to a distortion in the understanding of a topic due to an over-reporting of successful cases and an under-reporting of inconclusive ones.

To mitigate this risk, in this review multiple academic databases and keyword combinations were used, ensuring exhaustive coverage of the literature. In addition, studies were included or excluded only by considering their alignment with the inclusion criteria, rather than on their findings. Hence, within the context of this SLR, the overall risk of publication bias is considered low.

3.9.2 Bias in cross-study comparison

Different sources of bias may also arise from the comparison and interpretation of findings across studies. To address this risk, a cross-comparison of the reviewed articles was performed to identify any anomalies in the reported results. This step aimed to identify potential cases of bias in the way findings were interpreted or reported, especially when studies with similar organizational contexts or frameworks reached different conclusions.

By verifying the consistency of the evidence, this analysis helped reduce the overall risk of bias and increased the reliability of the results.

3.10 Assessment of the certainty

The certainty assessment is necessary to evaluate the overall level of confidence in the conclusion drawn from the review, taking into account the quality and reliability of the articles analyzed. In simple words, it indicates how strongly the results can be trusted to properly represent the research topic, being *the dimensions affecting the large-scale implementation of Agile Project Management* in this specific case.

To ensure the accuracy and reliability of the reviewed evidence, each study was assessed for alignment with the fundamental principles of the Agile methodologies it addressed. This step confirmed that the reported results were consistent with the theoretical and practical foundations of the frameworks analyzed. In addition, the sources of the selected studies were examined to evaluate their reliability. Although the review includes a limited number of studies and was conducted by a single reviewer, the consistency of the results across sources reinforces the reliability of the conclusions.

4 Results

After following the steps described in the previous chapter, the focus can now be shifted towards the results of the SLR. The chapter offers an objective and structured overview of the evidence emerging from the analyzed studies, focusing on what the data show rather than on their interpretation.

Following the procedure described in section 3.6, a total of 27 publications were included in this review. As was done for the excluded studies (section 3.7), each included paper was assigned an ID, following the alphabetical order of the authors, to allow for concise referencing throughout the analysis. All selected studies are listed in the Bibliography.

In line with the data synthesis process described in subsection 3.8.2, the results are presented in two main parts, a descriptive (section 4.1) and a thematic synthesis (section 4.2).

4.1 Descriptive synthesis

The descriptive synthesis provides a quantitative overview of the studies incorporated in the final dataset. It summarizes the general characteristics of the reviewed publications and highlights the main distributional trends. Table 2 recaps the main characteristics of the studies included in the review.[6]

[6] Notes:

- Hybrid: the article describes a combination of generic Agile practices with traditional Project Management approaches.
- Unspecified: the article discusses Agile in general terms, without referring to or applying a specific Agile approach.

ID	Year	Agile approach	Study Context
1	2023	Kanban Scrum	IT Software Development
2	2015	Scrum	Software Development
3	2024	DAD LeSS SAFe Scrum Spotify Model	SLR
4	2023	DAD LeSS Nexus SAFe Scrum Spotify Model	Finance Software Development
5	2020	DAD LeSS Nexus SAFe	Finance
6	2019	LeSS Nexus SAFe Scrum Spotify model	Multi-industry
7	2018	Hybrid Scrum	Software Development
8	2017	LeSS SAFe Scrum	Software Development
9	2022	Nexus LeSS SAFe Scrum Spotify model	SLR on Software Development
10	2023	SAFe	Finance
11	2017	LeSS Scrum	Software Development
12	2017	Hybrid Scrum	Software Development
13	2022	Scrum	SLR
14	2025	Unspecified	Finance
15	2019	Unspecified	Software Development
16	2023	Nexus	Software Development
17	2018	DAD LeSS Nexus SAFe Scrum	Software Development
18	2025	SAFe Scrum	Aerospace and Defense
19	2024	SAFe	Automotive
20	2024	SAFe	Finance
21	2025	DAD LeSS SAFe Scrum Spotify Model	Multi-industry
22	2022	Hybrid LeSS SAFe Scrum	SLR on Software Development
23	2024	DAD Hybrid LeSS Nexus SAFe Scrum Spotify Model	Multi-industry
24	2025	Hybrid LeSS SAFe Scrum Spotify Model	Multi-industry
25	2023	Kanban LeSS SAFe Scrum Spotify Model	Multi-industry
26	2017	SAFe	Software Development
27	2022	LeSS SAFe Spotify model	Service Industries

Table 2: Summary of the main features of the reviewed studies

Based on the reported information, the following analyses were conducted to describe the main distributional trends emerging from the reviewed dataset.

4.1.1 Distribution by year of publication

Figure 9 illustrates how the reviewed studies are spread across the years, providing an overview of how research activity has evolved over time.

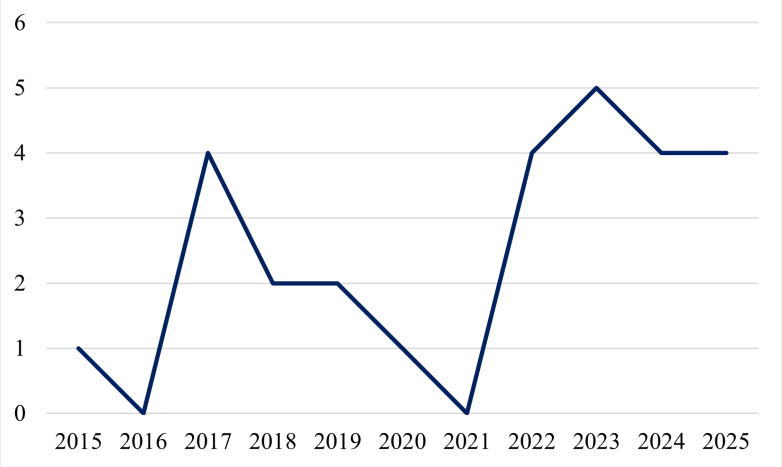

Figure 9: Distribution of the reviewed studies by year of publication

The data reveal a progressive and sustained growth in scholarly interest over the past decade, with more than half of the analyzed studies published between 2022 and 2025. This trend demonstrates the consolidation of Agile implementation as a key area of investigation within complex organizational settings.

4.1.2 Concentration and diffusion of Agile approaches

To provide a structured overview of how Agile approaches are represented in the reviewed literature, a comparative frequency analysis was conducted using two descriptive measures.

- First, approach concentration was computed as the share of references associated with each Agile approach relative to the total number of references across all approaches. For each *i*-th approach, where *i* denotes a specific Agile approach among the ones identified in the reviewed studies, concentration is defined as:

$$\text{Approach concentration}_i = \frac{\text{Number of references for approach}_i}{\text{Total number of references across all approaches}}$$

  This measure describes how references to Agile approaches are distributed in the reviewed studies.

- Second, approach diffusion was measured as the proportion of studies in which a given Agile approach appears at least once, relative to the total number of reviewed studies (27 in the context of this specific SLR). For every Agile approach recognized in the analyzed literature, diffusion is defined as:

$$\text{Approach diffusion}_i = \frac{\text{Number of studies mentioning approach }_i}{\text{Total number of reviewed studies}}$$

  This indicator reflects how widely each approach is addressed across the literature.

Figure 10 compares approach diffusion and concentration for the identified Agile approaches.

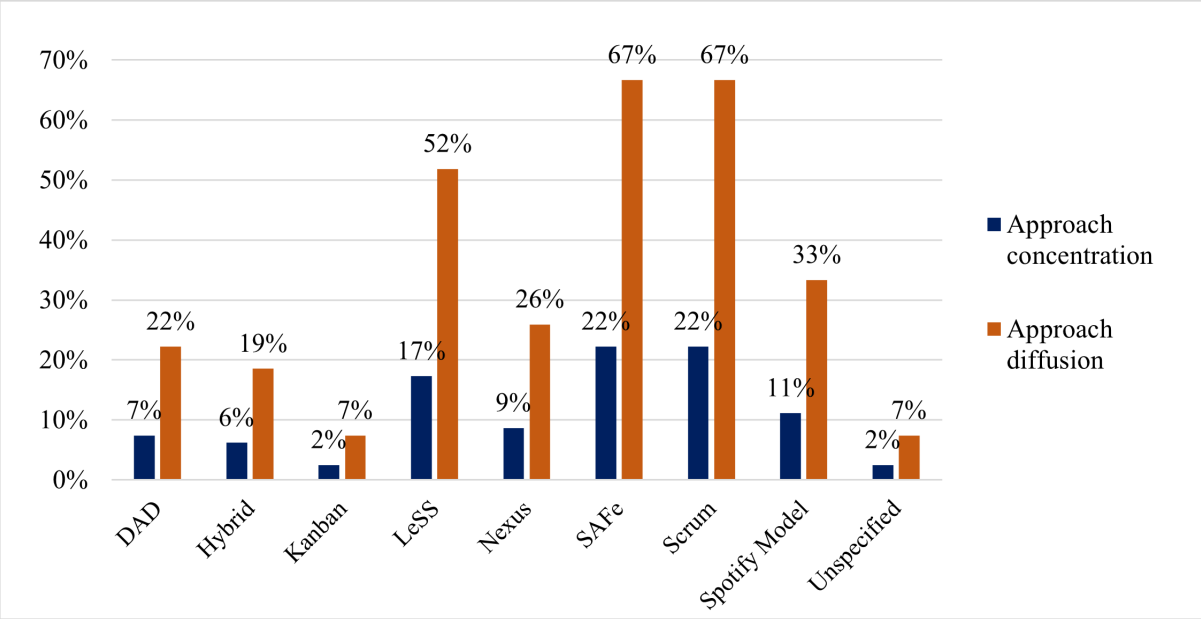

Figure 10: Approach concentration and diffusion in the reviewed literature

The results show that SAFe and Scrum display the highest values on both measures, appearing in 67% of the reviewed studies and each accounting for 22% of total references. LeSS also exhibits a relatively high diffusion (52%) and a notable share of references (17%). The Spotify Model shows moderate values, with a diffusion of 33% and a concentration of 11%. Other approaches, including Nexus, DAD, hybrid configurations and Kanban, appear in a smaller proportion of studies and account for more limited shares of total references.

Altogether, this distribution provides a descriptive mapping of how Agile approaches are represented within the reviewed literature and serves as contextual background for subsequent analyses.

4.1.3 Distribution by study context

The graph below shows how the analyzed publications are distributed across different research and application contexts, offering a snapshot of the environments in which Agile practices are explored (Figure 11).

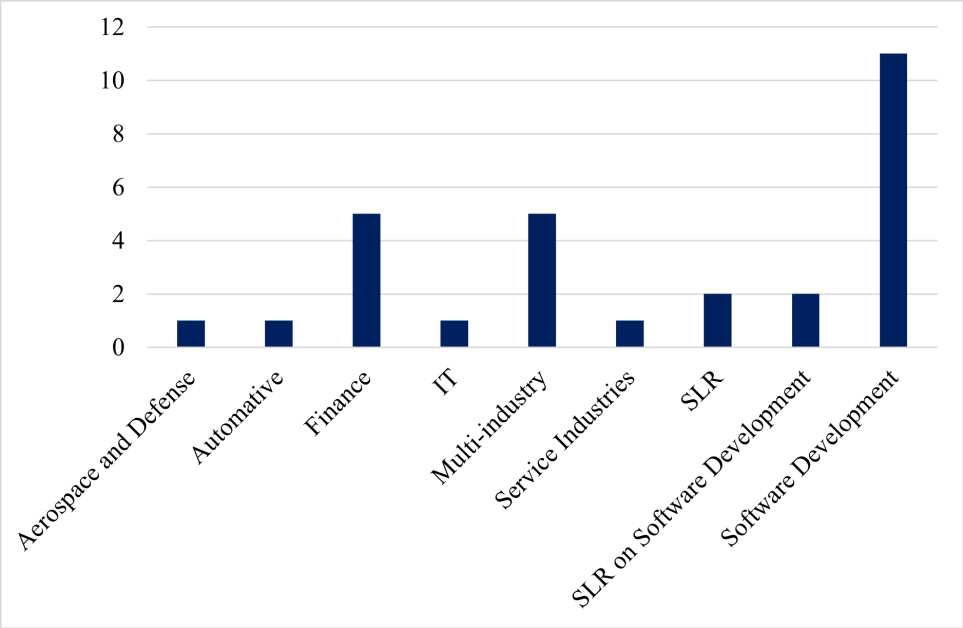

Figure 11: Distribution of the selected studies by study context

The results show that the software development domain represents the largest share of contributions (11 studies), confirming its position as the most frequently investigated context for large-scale Agile implementation. A significant portion of the studies also covers multi-industry and finance-related environments, while other industrial settings are less represented. A smaller part of the dataset consists of secondary research, including systematic literature reviews (SLRs). Specifically, two studies were classified as general SLRs, while two others focused specifically on SLRs related to software development.

4.1.4 Summary of findings

Overall, the descriptive synthesis highlights a body of literature that has expanded over the last decade, with a notable increase in publications in recent years. The reviewed studies mostly focus on a limited set of Agile approaches, particularly SAFe, Scrum and LeSS, while other frameworks appear less frequently and account for smaller shares of references. In terms of study context, the literature is largely centered on software development and cross-industry settings, with fewer studies adopting sector-specific or purely theoretical perspectives. These

findings are discussed in the next chapter.

4.2 Thematic synthesis

The thematic synthesis offers an objective overview of the recurring themes and relationships emerging from the reviewed literature. The analysis organizes the main evidence collected from the selected papers into categories. Each category represents a distinct dimension influencing the adoption and evolution of Agile practices at scale. The main categories identified through the synthesis process are presented below in alphabetical order, to ensure a neutral and transparent presentation:

- Agility Measurement and Maturity;
- Organizational and Managerial Factors;
- Process and Methodological Adaptation;
- Strategic and Transformational Factors;
- Team and Human-Related Factors.

The following sections describe the five categories, analyze their distribution across the analyzed studies, and summarize the main findings emerging from the synthesis.

4.2.1 Description of thematic categories

This section offers a detailed account of the five thematic categories identified in the synthesis process.

- **Agility Measurement and Maturity:** It relates to the assessment and evaluation of Agile performance and maturity within large organizations. It includes models and frameworks designed to measure progress, readiness, and the degree of Agile adoption across teams and departments. The theme supports a more evidence-based approach to evaluating transformation outcomes and identifying improvement priorities.
- **Organizational and Managerial Factors:** This category includes the structural, cultural, and managerial conditions that determine the success of Agile adoption within large organizations. Leadership commitment, governance alignment, and cultural readiness consistently emerged as critical enablers of large-scale implementation. Top management support also plays a central role in sustaining transformation efforts. Additional

aspects include organizational learning, readiness for change, and the development of a collaborative culture that balances flexibility with control. Together, these elements highlight the importance of organizational and managerial alignment in creating a favorable environment for scaling Agile practices.

- **Process and Methodological Adaptation:** Organizations adapt and tailor Agile methods to meet the demands of complex large-scale environments. Empirical evidence indicates that companies frequently modify frameworks combine them with traditional management approaches to align with existing organizational structures. These adaptations often lead to to the development of customized models aimed at preserving agility while maintaining consistency across teams. The studies underline that methodological flexibility is essential for aligning Agile principles with organizational constraints.

- **Strategic and Transformational Factors:** The strategic, governance, and change-management dimensions guiding large-scale Agile transformations represent the key focus of this theme. It includes aspects such as strategic alignment, portfolio management, and enterprise-level governance, which ensure that Agile initiatives are consistent with business goals. Multiple studies describe transformation as an organization-wide process requiring top management involvement, coordination across functions, and structured governance mechanisms. The evidence also suggests that sustained transformation relies on the integration of Agile principles into corporate strategy, enabling long-term adaptability and continuous value delivery.

- **Team and Human-Related Factors:** The human and interpersonal dimensions are key in enabling the effective functioning of Agile teams at scale. Collaboration, communication, and coordination across multiple teams were identified as critical success elements. Practices such as cross-functional teamwork, self-organization, and shared accountability can foster autonomy and engagement. In summary, the literature underscores the importance of people-centered practices and interpersonal trust in sustaining large-scale Agile transformations.

Taken together, the five categories provide a structured overview of the key factors influencing large-scale Agile transformation, forming the analytical foundation for the subsequent assessment of their distribution. Although presented separately for clarity, their interrelationships are discussed in the following chapter.

4.2.2 Thematic concentration and diffusion across dimensions

Similarly to the analysis conducted for Agile approaches (section 4.1.2), to examine how the academic attention is distributed across the categories, a comparative frequency analysis was performed using the same two measures of concentration and diffusion.

- In this context, category concentration refers to the relative share of references associated with each thematic category. For each *j*-th category, where *j* ranges from 1 to 5, corresponding to the five identified thematic categories, category concentration is therefore defined as:

$$\text{Category concentration}_j = \frac{\text{Number of references for category}_j}{\text{Total number of references across all categories}}$$

- Category diffusion instead indicates the proportion of studies in which a given category appears at least once. Hence, for every *j*-th category, category diffusion is defined as:

$$\text{Category diffusion}_j = \frac{\text{Number of studies mentioning category}_j}{\text{Total number of reviewed studies}}$$

As previously defined, concentration captures how references are distributed across thematic categories, while diffusion reflects their presence across studies. Figure 12 compares the two measures across the five categories.[7]

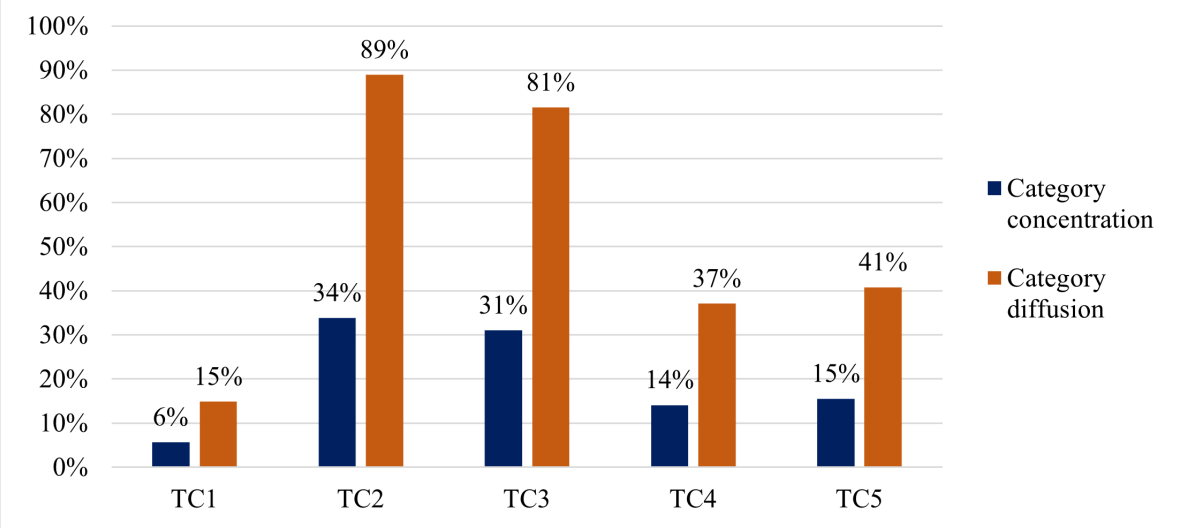

Figure 12: Category concentration and diffusion across the five categories

[7] The labels TC1-TC5 in Figure 12 are used just for readability purposes to represent the five thematic categories.

The results highlight that Organizational and Managerial Factors (TC2) and Process and Methodological Adaptation (TC3) have both high category concentration (34% and 31%, respectively) and high diffusion values across studies (89% and 81%), indicating that these dimensions receive substantial analytical attention.

By contrast, Agility Measurement and Maturity (TC1), Strategic and Transformational Factors (TC4) and Team and Human-Related Factors (TC5) exhibit lower levels of category concentration relative to their diffusion. While these categories appear in a non-negligible share of studies (ranging from 15% to 41%), they account for a smaller proportion of total coded occurrences (between 6% and 15%). This pattern indicates that, while these categories are present across a substantial share of the reviewed studies, they account for a smaller proportion of the total thematic occurrences.

Overall, the comparison distinguishes between categories that account for a larger share of thematic occurrences within the literature and those that appear more frequently at the study level but represent a smaller share of the total references. This distinction reflects differences in how academic attention is distributed across the identified themes, rather than differences in their relevance or importance.

Table 3 complements Figure 12 by showing the distribution of thematic categories across individual papers, offering a detailed look at their representation in the literature. The data reveal that the majority of the studies tackle several thematic categories simultaneously, highlighting the multi-dimensional nature of Agile adoption at scale.

ID	Agility Measurement and Maturity	Organizational and Managerial Factors	Process and Methodological Adaptation	Strategic and Transformational Factors	Team and Human-Related Factors
1		×	×	×	
2		×	×		×
3		×			×
4		×	×		
5			×		×
6		×	×		
7		×	×		×
8		×	×	×	
9	×		×		
10	×	×	×		
11		×			×
12		×	×	×	
13			×	×	
14		×		×	×
15		×	×	×	
16		×	×		×
17		×	×		
18		×	×		
19		×	×		
20		×		×	×
21	×	×	×	×	
22		×	×		×
23		×			×
24		×	×		×
25		×	×	×	
26	×	×	×		
27		×	×	×	
	4	**24**	**22**	**10**	**11**
	Total per category				

Table 3: Study-level distribution of thematic categories

4.2.3 Summary of findings

The results of the thematic synthesis provide a structured overview of the key dimensions influencing the large-scale implementation of Agile approaches. As outlined in the previous sections, five thematic categories were identified, each representing a dimension influencing the adoption and evolution of Agile practices at scale.

To summarize these findings, Table 4 presents an integrated view of the categories, including their core focus and concentration across the analyzed papers. Category concentration is used as the primary summary indicator, as it provides a more granular representation of how thematic references are distributed across dimensions within the reviewed literature.

Thematic Category	Description	Category Concentration
Agility Measurement and Maturity	Frameworks and models assessing Agile maturity, performance, and organizational readiness	6%
Organizational and Managerial Factors	Leadership, governance, and cultural conditions that support Agile adoption in large organizations	34%
Process and Methodological Adaptation	Customization and hybridization of Agile frameworks to fit complex organizational environments	31%
Strategic and Transformational Factors	Governance, portfolio alignment, and enterprise-level mechanisms guiding Agile transformation	14%
Team and Human-Related Factors	Collaboration, communication, and coordination practices sustaining team performance at scale	15%

Table 4: Overview of the five thematic categories, their core focus and concentration

In synthesis, the results show that research on large-scale Agile primarily focuses on structural and procedural elements, while fewer studies address measurement, human, or strategic aspects. The following chapter presents the discussion of these findings.

5 Discussion

This chapter discusses the results presented in Chapter 4 to deeply explore the key dimension shaping large-scale Agile implementation, treating the identified thematic categories as analytical dimensions to enable a higher-level interpretation. The chapter is organized into three parts: interpretation of the main and secondary results section 5.1, theoretical implications section 5.2, and practical implications section 5.3.

5.1 Main and secondary results

The findings indicate that the successful implementation of Agile Project Management at scale is influenced by a set of interrelated dimensions, rather than by the adoption of specific frameworks alone. In particular, organizational and managerial factors, together with process and methodological adaptation, emerge as the most prominent dimensions shaping large-scale Agile transformations.

5.1.1 Interpretation of findings

Interpreting the results, the review suggests that large-scale Agile adoption is understood in the literature as an organizational and methodological transformation rather than as a simple extension of team-level practices. This perspective aligns with prior studies that frame Agile scaling as a process involving changes in structures, governance, and cultural arrangements alongside the adaptation of Agile frameworks (Edison et al., 2022; Hron and Obwegeser, 2022; de Oliveira Santos and Monteiro de Carvalho, 2022).

At the same time, the concentration of evidence on organizational and methodological dimensions, which together account for more than 60% of the total thematic references and appear in the majority of the reviewed studies, indicates a selective emphasis within the literature. Strategic alignment, human-related factors, and measurement practices receive comparatively less attention. This imbalance has implications for how large-scale agility is conceptualized, as it risks under-representing dimensions that are critical to its realization yet remain less considered in academic discussions.

5.1.2 Discussion of key themes

Building on the proposed interpretation of the findings outlined above, the analysis examines how organizational alignment and methodological adaptation operate in practice as core foundations of successful large-scale Agile implementation, and how they are sustained and shaped

by strategic, human, and evaluative dimensions. Table 5 consolidates the main insights derived from each thematic category.

Thematic Category	Category Concentration	Main Insight
Agility Measurement and Maturity	Low (6%)	Models and indicators proposed to assess Agile progress
Organizational and Managerial Factors	High (34%)	Leadership support, governance alignment, and cultural readiness identified as key aspects
Process and Methodological Adaptation	High (31%)	Frequent tailoring and hybridization of frameworks to fit enterprise context
Strategic and Transformational Factors	Moderate to Low (14%)	Scaling viewed as enterprise-wide transformation requiring strategic alignment and executive involvement
Team and Human-Related Factors	Moderate to Low (15%)	Collaboration, trust, and continuous learning recognized as essential for scalability

Table 5: Key points across the thematic categories

Leadership commitment, governance alignment, and cultural readiness are consistently identified as critical factors, confirming that scaling Agile requires more than training teams in iterative practices (Conboy and Carroll, 2019; Putta et al., 2024; Wessel et al., 2022). Organizational readiness integrates these dimensions by fostering the alignment of leadership, culture and structure, thereby facilitating their interaction in sustaining large-scale Agile transformations (de Oliveira Santos et al., 2025).

Despite this, existing literature continues to emphasize the adoption of Agile scaling frameworks as a primary driver of large-scale transformation; however the findings indicate that frameworks alone are insufficient to explain successful implementation outcomes. In this respect, the identified categories provide a more detailed basis for understanding how different organizational, methodological, and several other factors jointly shape large-scale Agile implementation.

At the methodological level, large enterprises tend to tailor or combine Agile approaches to balance agility with existing constraints (Hron and Obwegeser, 2022; Kalenda et al., 2018; Kreye et al., 2025; Mayer and Recker, 2024). This integration supports coherence and flexibil-

ity but can lead to over-formalization if the frameworks become overly prescriptive. Effective implementations therefore maintain principle-based flexibility, employing frameworks as coordination instruments rather than as rigid procedures, which helps prevent the loss of adaptability observed in larger and more formalized contexts (Hron and Obwegeser, 2022; Jørgensen, 2019).

An important theme is the balance between autonomy and standardization: insufficient coordination leads to fragmentation, while excessive control reduces adaptability. Heikkilä et al. (2017) underlines that maintaining this balance requires the use of coordination mechanisms to manage requirements and dependencies among multiple teams in large-scale Agile environments.

Beyond organizational and methodological aspects, the analysis identified three additional dimensions that contribute to the implementation of Agile at scale:

- Agility Measurement and Maturity, supporting reflection, feedback, and learning processes that enable organizations to monitor progress and adjust Agile practices over time;
- Strategic and Transformational Factors, providing direction and coherence to Agile initiatives by aligning them with corporate strategy and long-term goals;
- Team and Human-Related Factors, shaping collaboration, trust, and learning across teams, which in turn affect the sustainability and effectiveness of large-scale Agile adoption.

Table 6 summarizes how each thematic category contributes to sustaining large-scale Agile transformations.

Thematic Category	Contribution to large-scale Agile
Agility Measurement and Maturity	Enable feedback and learning mechanisms that support continuous improvement
Organizational and Managerial Factors	Support transformation through strategic direction and supportive culture
Process and Methodological Adaptation	Balance flexibility and coordination across teams
Strategic and Transformational Factors	Embed agility within long-term goals
Team and Human-Related Factors	Strengthen collaboration, engagement and cross-functional learning across teams

Table 6: Contribution of the thematic categories to large-scale Agile transformations

When these dimensions evolve together, Agile can be interpreted as an organizational capability that supports flexibility and value creation. Conversely, when one or more of them are weak or neglected, organizations tend to adopt Agile only in form rather than in substance, performing its rituals without achieving substantive transformation (Conboy and Carroll, 2019).

5.1.3 Context and time trends

Most contributions come from software development contexts (11 out of 27 studies), reaffirming the field's origin.

However, the presence of multi-industry and finance-related research (five studies each) demonstrates growing diffusion beyond IT. Broadly speaking, contextual constraints affect how Agile can be operationalized. For instance, industries with stricter regulatory environments or hierarchical structures may encounter greater challenges in adopting Agile methods effectively (Bass, 2015; Christopher and Vries, 2020; Putta et al., 2024).

Regarding the temporal trend, as shown in Figure 9 (subsection 4.1.1), publications peaked after 2022, confirming a growth phase in research activity. This trajectory suggests that large-scale Agile transformations are increasingly acknowledged as a relevant topic in both practice and academic community, reflecting a maturing and diversifying research landscape.

5.1.4 Concluding remarks

In summary, the findings support an interpretation of large-scale Agile as an organizational transformation shaped by multiple dimensions. While organizational and methodological aspects are more extensively addressed in the literature, other themes receive comparatively less systematic attention, despite their relevance for sustaining agility over time.

These dimensions are pivotal to the evolution of Agile methods from isolated project related practices to enterprise-wide capabilities.

5.2 Theoretical implications

The findings discussed in the previous sections contribute to a deeper theoretical understanding of how Agile Project Management can be applied in large organizations.

The results indicate that large-scale Agile implementation requires more than the replication of team-level methods. It constitutes a multidimensional transformation that reshapes structures, governance, and culture, while redefining coordination practices and leadership roles throughout the enterprise (Sónta-Drączkowska and Krogulec, 2024). When viewed through this lens, the focus on frameworks and methodological prescriptions in the literature appears insufficient to fully account for the organizational complexity highlighted by the findings.

From a theoretical point of view, this shift highlights the need to examine Agile at scale not only through isolated frameworks, but through the interaction of multiple dimensions.

5.2.1 Refining Agile frameworks

The descriptive synthesis in Chapter 4 shows that established frameworks, such as SAFe, LeSS, and Scrum, dominate the reviewed literature. This prevalence confirms their importance as reference models for coordination and governance, while also exposing their theoretical limitations.

Empirical evidence indicates that large organizations rarely implement frameworks as designed. Instead, they adapt them to suit their specific needs. Large enterprises often need to tailor frameworks to align their tools with their existing governance and financial systems (Kalenda et al., 2018; Mayer and Recker, 2024).

From this perspective, agility at scale depends less on compliance with predefined frameworks and more on the ability to adapt governance structures, roles and internal mechanisms to the organizational context. (Conboy and Carroll, 2019; Hobbs and Petit, 2017).

5.2.2 Linking the dimensions

As discussed earlier, organizational and methodological themes are the most extensively discussed across the selects literature. Rather than being independent analytical categories, the organizational and methodological dimensions emerge as deeply interconnected, each reinforcing the other in the implementation of large-scale Agile. This connection becomes clear when looking at how organizations combine structural and process-related changes:

- Adapting Agile frameworks necessitates active governance and leadership support, as management commitment is crucial for translating Agile flexibility into tangible organizational change, a dynamic that depends on sustained executive involvement and cultural reinforcement (Carroll et al., 2023);

- Aligning structures and teams relies on having frameworks and processes flexible enough to support coordination and learning across multiple units, where interdependencies and uncertainty call for a balance between formal and informal mechanisms (Bass, 2015; Dingsøyr, Moe, et al., 2018).

Taken together, these findings suggest that governance mechanisms do not simply constrain Agile practices, but instead enable methodological adaptation allowing organizations to tailor frameworks while preserving coherence at scale. This interaction shows that large-scale Agile operates as a mechanism of organizational transformation that requires rethinking both methods and structures to enable continuous adaptation. As emphasized by de Oliveira Santos and Monteiro de Carvalho (2022), scaling Agile should be viewed as a systematic process in which structures, leadership practices and multiple other enterprise facets evolve together to enable sustained transformation.

The findings also indicate that organizational and methodological alignment alone is insufficient to fully explain the consolidation of agility at scale. Additional dimensions play a critical role in stabilizing and directing Agile transformation beyond localized implementations and therefore must also be taken into account. Strategic and transformational factors provide direction and coherence to Agile initiatives, influencing higher-level decision-making process,

governance priorities, and the long-term scope of transformation efforts. Without such strategic anchoring, methodological adaptations risk remaining localized, fragmented, or disconnected from enterprise objectives (de Oliveira Santos et al., 2025; Wessel et al., 2022). Similarly, team and human-related factors represent the micro-level mechanisms through which organizational and methodological choices are enacted in practice. Collaboration, learning, and trust enable teams to translate structural arrangements and process designs into effective day-to-day behaviors, supporting coordination and continuous improvement across the enterprise (Heikkilä et al., 2017; Hutter et al., 2025). In this sense, human and social practices mediate the relationship between formal structures and organizational outcomes. Agility measurement and maturity further contribute by enabling feedback loops that connect practices, performance, and learning, thereby supporting the stabilization and renewal of Agile initiatives over time (Gogichaty et al., 2023; Turetken et al., 2017).

From a theoretical perspective, this aligns Agile with the concept of dynamic capabilities, where organizations maintain adaptability by constantly reconfiguring structures, processes, and learning routines. Hutter et al. (2025) expand this perspective by highlighting how firms cultivate agility through the development of dynamic capabilities, to embed adaptability into their organizational systems. Edison et al. (2022) argue that the diversity of scaling approaches across organizations reflects the lack of a unified theoretical model for large-scale agility, reinforcing the view that agility at scale constitutes an adaptive organizational capability, and not the simple adherence to a specific framework.

Figure 13 provides a conceptual synthesis of the interdependecies discussed above, summarizing how the five dimensions jointly contribute to large-scale Agile as an organizational capability.

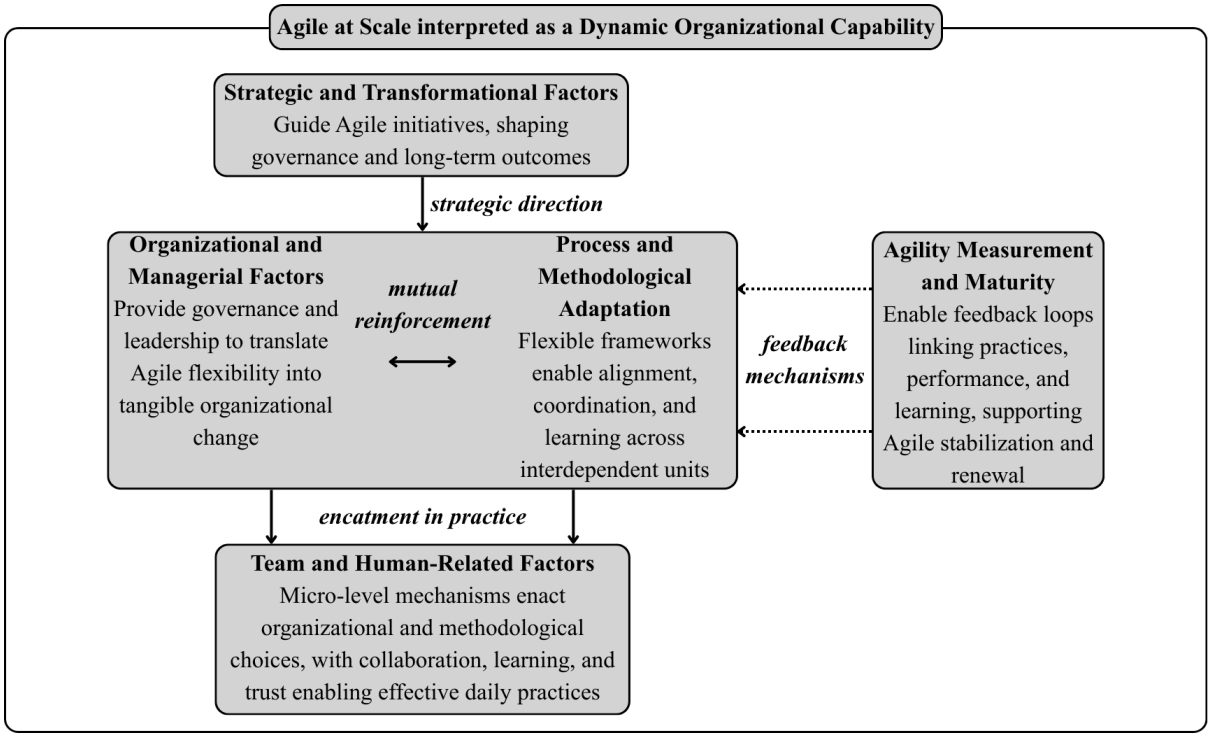

Figure 13: Interrelationships among the dimensions

Scaling Agile therefore means building a dynamic organizational capability that integrates structural alignment and methodological flexibility with strategic direction, human practices, and feedback mechanisms, enabling large enterprises to manage complexity while also preserving long-term adaptability.

5.2.3 Addressing theoretical gaps

The analysis reveals three main theoretical gaps:

- Agility measurement and maturity;
- Team and human dynamics;
- Strategic and transformational elements;

The reviewed literature primarily focuses on structures and processes, leaving these dimensions unexplored, as can be seen by their concentration and diffusion values (Figure 12). This imbalance limits the current theoretical understanding of how agility is sustained over time and highlights the need for a more human-centered and evidence-based theory of Agile scaling, where behavioral and evaluative mechanisms are treated as integral components of organizational transformation. By synthesizing the literature through a multi-dimensional framework,

this study contributes to theory by making these imbalances explicit and by understanding large-scale agility as a capability that emerges from the interaction of underexplored human, strategic, and evaluative mechanisms, rather than as a predominantly structural or procedural phenomenon.

Future research should aim to expand and integrate existing models of large-scale Agile to address these neglected areas. In particular, future studies should:

- Strengthen the theoretical basis for agility measurement, linking assessment frameworks and maturity models to performance, governance, and continuous improvement;
- Develop human-centered theoretical models explaining how collaboration, trust, and learning mechanisms sustain agility over time;
- Elaborate frameworks that link Agile scaling with strategic alignment and portfolio governance, clarifying how strategic intent and organizational transformation co-evolve in achieving enterprise-level agility.

Advancing these directions would help move Agile theory toward a more comprehensive and empirically grounded understanding of how organizations build, sustain, and renew agility as a long-term capability.

5.2.4 Concluding remarks

Overall, the findings support an interpretation of large-scale Agile as a dynamic organizational capability built on the interaction between structure, methods, and people. In line with this perspective, the results inform existing discussions by highlighting the importance of contextual adaptation and learning processes, rather than strict adherence to predefined frameworks.

From a theoretical point of view, this study contributes by reframing large-scale Agile away from a framework-centric view toward a dimensional perspective that highlights the role of contextual adaptation, learning processes, and capability development over time. This interpretative shift does not reject the role of frameworks, but instead it situates them within a broader organizational configuration, which is further discussed in the concluding chapter.

At the same time, the review points to underexplored areas, particularly within the human, strategic, and measurement dimensions, suggesting opportunities for further theoretical development. Future research should therefore focus on these underrepresented dimensions to achieve a more balanced theory of enterprise agility.

5.3 Practical implications

Large-scale Agile does not only represent a theoretical construct, but also a managerial and operational challenge (Conboy and Carroll, 2019; Hobbs and Petit, 2017; Putta et al., 2024; Sónta-Drączkowska and Krogulec, 2024). The literature suggests that large-scale Agile adoption depends on coordinated actions across multiple organizational layers. Accordingly, the five identified dimensions provide a coherent framework for understanding how theoretical concepts can be translated into actionable practices.

5.3.1 Practical implications across the thematic categories

The following presents a schematic analysis of how each thematic category can support enterprises in designing context-sensitive Agile systems.

- **Agility Measurement and Maturity:** To sustain improvement and guide decision-making, companies need comprehensive feedback and measurement systems that integrate both qualitative and quantitative perspectives. Such systems should link Agile performance to broader business outcomes, supporting accountability, learning, and strategic alignment across the enterprise (de Oliveira Santos et al., 2025).
  Key recommendations include:
  - Defining multidimensional metrics that assess value delivery, customer impact, and innovation capacity;
  - Using maturity models to evaluate progress over time, identify improvement areas, and compare practices across units or departments;
  - Embedding measurement into governance structures to ensure transparency and foster data-driven decision-making;
  - Combining quantitative indicators with qualitative feedback tools, to capture the human and cultural aspects of agility.

By integrating these approaches, measurement also serves as a mechanism for continuous learning and adaptation, enabling organizations to evolve their Agile practices in response to changing contexts and objectives. Furthermore, it allows for the assessment of organizational maturity through models that guide progressive improvement over time (Turetken et al., 2017). Gogichaty et al. (2023) expand this view by proposing a systemic, data-driven approach for evaluating organizational agility, combining quantitative metrics with qualitative insights to identify misalignments between stated goals and actual practices.

- **Organizational and Managerial Factors:** Empirical evidence shows that successful Agile scaling depends on strong leadership commitment, strategic alignment, and a governance system that guarantees autonomy while maintaining coherence across the enterprise (Hutter et al., 2025; Putta et al., 2024). Carroll et al. (2023) underline that sustaining agility over time requires involving these principles into daily routines and decision-making processes, as superficial managerial support often leads to the erosion of agile practices. In this perspective, managers are pivotal in translating strategic intent into everyday behaviors, ensuring that agility becomes part of the organizational fabric. They are expected to act as facilitators of learning and coordination, promoting a culture of trust, transparency, and shared ownership.
  Practical recommendations include:

  - Establishing clear decision-making boundaries through minimal viable governance structures;
  - Ensuring that leadership consistently communicates the vision and purpose of Agile transformation to all the actors involved in the process;
  - Encouraging cross-level collaboration between management and delivery teams to sustain alignment and engagement.

  Establishing such leadership and governance dynamics involves following an incremental path leading towards a comprehensive transformation where agile principles are fully integrated with the company structure (Hobbs and Petit, 2017).

- **Process and Methodological Adaptation:** The findings confirm that rigid adherence to frameworks rarely leads to lasting agility (Conboy and Carroll, 2019; Edison et al., 2022). Large enterprises should tailor or customize Agile frameworks, based on their existing structure and culture (Hron and Obwegeser, 2022; Kreye et al., 2025).
  Managers and transformation leads can therefore benefit from:

  - Combining practices from multiple frameworks to achieve a balance between standardization and flexibility;
  - Using frameworks as coordination mechanisms rather than strict prescriptive models;
  - Promoting principle-based agility, allowing teams to tailor methods while remaining aligned with shared goals and values.

  These approaches can help organizations balance the need for cross-team coordination with the flexibility required to respond to contextual constraints. In practice, this reduces the risk of over-formalization and supports the gradual consolidation of Agile ways of working across.

- **Strategic and Transformational Factors:** Agile transformation should not be understood as a project-level initiative but as a strategic evolution of the enterprise (de Oliveira Santos et al., 2025). Integrating Agile principles into corporate governance enables organizations to translate adaptability into sustained performance.
  Recommended practices include:

  - Integrating Agile decision-making principles into strategic planning and investment processes;
  - Aligning portfolio management and resource allocation with Agile values;
  - Recognizing transformation as a long-term process that sustains the development of organizational capabilities.

  Ensuring alignment between agile practices and enterprise architecture is essential to preserve strategic coherence while supporting adaptability across the various organizational layers (Wessel et al., 2022).

- **Team and Human-Related Factors:** The reviewed studies highlight collaboration, learning, and motivation as the mechanisms that translate structural change into behavioral change (Heikkilä et al., 2017; Hutter et al., 2025). Organizations should invest in training, coaching, and cultural development to empower teams and build psychological safety. Effective actions include:
  - Promoting cross-functional collaboration and a sense of collective ownership;
  - Encouraging experimentation and learning from failure;
  - Supporting leadership development at all levels to sustain cultural change.

  Putta et al. (2024) note that leadership support and psychological safety are critical enablers of collaboration and learning, especially in traditional corporate contexts where hierarchy remains strong.

5.3.2 Concluding remarks

Practical evidence shows that scaling Agile successfully depends on aligning leadership, processes, and people within a flexible governance framework. Organizations achieve sustainable agility when strategic direction, methodological adaptation, and cultural development evolve together rather than in isolation. Maintaining this balance enables enterprises to coordinate complex structures while preserving the flexibility needed for learning and innovation.

In essence, large-scale agility emerges from the development of capabilities that facilitate continuous organizational adaptation and long-term value creation.

6 Conclusions

The present chapter concludes the study by reflecting on the main findings and their implications. It first offers an interpretative perspective on the results (section 6.1), then acknowledges the delimitations (section 6.2) and limitations (section 6.3) of the analysis. Lastly, it outlines directions for future research (section 6.4).

6.1 Study contribution

The study addresses the research question *"What dimensions influence the successful implementation of Agile Project Management techniques in large-scale enterprises?"* through a SLR. Based on the analysis of 27 studies, five main dimensions that influence Agile scaling were identified (section 4.2):

- Agility Measurement and Maturity;
- Organizational and Managerial Factors;
- Process and Methodological Adaptation;
- Strategic and Transformational Factors;
- Team and Human-Related Factors.

The findings indicate that successful implementation depends on achieving a balance between structural alignment, methodological flexibility, and cultural readiness, supported by leadership commitment and collaboration (Carroll et al., 2023; Ebert and Paasivaara, 2017; Wessel et al., 2022) These elements operate within a broader configuration that also includes strategic alignment, human-related aspects and continuous feedback processes, underlying the multi-dimensional nature of agility at scale.

The study conceptualizes large-scale agility as a dynamic organizational capability that enables continuous adaptation through the reconfiguration of structures and learning mechanisms. In line with this perspective, Joskowski et al. (2023) indicates that large-scale Agile transformation should be conceived as an incremental and context-dependent process rather than a top-down organizational revolution. Hutter et al. (2025) further demonstrate how this adaptive process unfolds through the development of sensing, seizing, and transforming capabilities

across all organizational levels. In addition, Camara et al. (2024) emphasize the role of organizational learning and adaptive knowledge sharing in maintaining and strengthening these capabilities over time.

Taken together, these findings indicate that, by synthesizing existing empirical evidence into a set of core and interrelated dimensions, this work interprets Agile at scale as an organizational phenomenon shaped by multiple interdependent conditions, rather than as a matter of framework selection or process design. Building on this interpretation, from a theoretical standpoint, the study shifts attention from framework-centric explanations to capability-building processes. From a practical standpoint instead, it offers a interpretative lens for interpreting enterprise agility that goes beyond the adoption of specific scaling models, emphasizing the importance of alignment, learning, and governance mechanisms in sustaining long-term organizational resilience.

Overall, the thesis strengthens the understanding of enterprise agility as both a methodological evolution and a strategic organizational capability. In this view, long-term organizational resilience emerges from the continuous balancing of autonomy and coordination, alongside the integration of adaptability into governance systems, rather than relying on predefined scaling models.

6.2 Delimitations

This section clarifies the boundaries of the study. The scope of this study was defined to ensure methodological rigor and to remain consistent with the research question guiding the process. Therefore, the review focused on the application of Agile Project Management practices within large-scale enterprises, with the purpose of identifying the dimensions that shape their effective implementation in complex organizational environments.

In line with the objective of the study, a Systematic Literature Review (SLR) was conducted using the PRISMA 2020 framework (Page et al., 2021) as reference, adapted to the context of this work. This approach, which included the use of the PRISMA 2020 flow diagram (Figure 8) to summarize the selection process (section 3.6), ensured the transparency and replicability of the review. This methodological rigor allowed for a robust and evidence-based synthesis of the academic literature.

The search strategy involved a targeted query across the SageJournals and Pico Polito databases, selected for their demonstrated reliability and coverage of topics related to the research question. Searches were conducted between July and September 2025 using predefined keywords, listed in (section 3.4) to identify the relevant literature. The inclusion criteria (section 3.5) were established ex-ante to ensure consistency and reproducibility of the review process. These criteria defined the boundaries of the research in several ways. The temporal boundary was set between 2015 and 2025 to include recent and up-to-date studies, thereby increasing the relevance of the analyzed evidence to the current state of research on large-scale Agile. In addition, only works classified as articles, research papers, or reviews within the fields of Engineering, Management, and Business were considered. The selection of these fields was guided by the expertise of the reviewer, ensuring a higher level of comprehension of the selected literature .

The decision to limit the review to large-scale enterprises reflects a deliberate focus on contexts characterized by organizational complexity, strict hierarchy and enterprise-level governance. Such contexts often intensify the challenges of inter-team coordination, dependency management, and resistance to change, particularly within globally distributed or highly regulated environments. (Bass, 2015; Christopher and Vries, 2020; Putta et al., 2024). This delimitation allowed the analysis to target the elements impacting on Agile adoption beyond project-level boundaries, in line with the study's objective.

The synthesis process (subsection 3.8.2) was structured into two sequential phases to analyze the extracted data: a descriptive synthesis, summarizing distributional and contextual trends, and a thematic synthesis, identifying the main conceptual categories emerging across studies. This two-step structure was chosen to ensure both analytical transparency and conceptual depth in the findings.

6.3 Limitations

The section details the main limitations that may affect the validity and generalizability of findings, along with their potential influence on the results.

- **Methodological constraints:** These are the limits regarding the design chosen to carry out the review. This SLR was conducted by one reviewer, and, within the methodological domain, this aspect represents the main constraint of the study. Despite the use of predefined inclusion criteria and a transparent procedure, both guided by the PRISMA

2020 framework (Page et al., 2021) to ensure methodological rigor, the single-reviewer approach may still have introduced a certain degree of subjectivity.

- **Data-related constraints:** They are the limitations that arise from the nature and quality of the data. These constraints are inherent to the data itself. Concerning sample size and heterogeneity, the final dataset is composed by 27 studies, which were conducted using diverse designs. This variability may reduce direct comparability between studies and may make the identification of consistent patterns across contexts more challenging. Moreover, publication bias falls into this category. Although efforts were made to mitigate this bias through the use of multiple databases, keywords, and inclusion criteria independent of study outcomes, a residual tendency to publish positive results cannot be fully excluded. The observed thematic coverage imbalance, with organizational and methodological aspects prevailing over other themes, emerges from the distribution of evidence across the reviewed publications. Although this distribution is not the result of selective interpretation or methodological bias, it still may shape the overall orientation of the findings and conclusions.

- **Contextual constraints:** These are external factors, such as the environment of the studies, that may influence the generalizability and applicability of the findings. The literature demonstrates a concentrated focus on software development, being the most represented context, with secondary emphasis on multi-industry and finance. This domain concentration skews the evidence toward settings where Agile scaling is more mature, limiting the generalizability to underrepresented sectors (Edison et al., 2022; de Oliveira Santos and Monteiro de Carvalho, 2022). Comparable studies on large organizations also suggests that scaling Agile outside its original software context requires contextual adaptation and structural adjustment to existing governance systems (Hobbs and Petit, 2017). It also emerges a framework emphasis. The frequent reference to structured scaling frameworks reflects their role as guiding models in the literature, yet both academic reviews and empirical studies highlight that these approaches provide limited practical guidance and may bias insight toward formalized coordination, overlooking more adaptive or hybrid practices (Edison et al., 2022; Turetken et al., 2017).

Overall, the stated limitations primarily relate to the design of the review, as well as the specific features and the contextual distribution of the analyzed evidence. These aspects do not under-

mine the methodological rigor of the study but instead establish the boundaries within which its conclusions should be interpreted.

6.4 Future research streams

The perspectives outlined here emphasize key gaps and overlooked themes within the existing literature, offering directions for future studies to extend, test, or reconsider the findings presented in this review.

6.4.1 Open questions in the literature

The results highlight different areas where existing research on large-scale Agile implementation remains fragmented. Although the literature provides substantial insights into organizational and methodological conditions, other important aspects are still underrepresented:

- Questions remain regarding how social and cultural factors, such as collaboration, trust, motivation, and learning contribute to sustaining agility over time and influence the Agile transformation outcomes (Kalenda et al., 2018; Stan et al., 2025).
- There is limited theoretical understanding of how strategic alignment and related elements shape Agile transformations at the enterprise level, and how these elements interact with organizational change processes (Hron and Obwegeser, 2022; de Oliveira Santos et al., 2025).
- Further investigation is needed to explore how agility can be measured, monitored, and linked to performance outcomes using comprehensive evaluation approaches (Gogichaty et al., 2023; Turetken et al., 2017).
- Current research remains strongly focused on software development and IT-related domains, with limited evidence on how Agile methods can be scaled in other sectors with unique coordination and governance challenges (Conboy and Carroll, 2019; de Oliveira Santos and Monteiro de Carvalho, 2022).

Taken together, these areas highlight where academic focus remains uneven and signal potential trajectories for further development toward a deeper understanding of enterprise agility.

6.4.2 Advancing the present work

Building on the scope and limitations of the study, future research can extend and refine the current evidence. Besides the limits deriving from the single-reviewer approach (section 6.3), which can be easily addressed through collaborative review processes, there are other areas of potential improvement.

With regard to theory building, integrating the study of large-scale Agile with the dynamic capabilities framework offers a valuable opportunity to expand its conceptual foundation. Given that the findings suggest that agility at scale can be interpreted as an organizational capability that supports continuous adaptation, future research should further explore this connection. Viewing enterprise agility through the perspective of dynamic capabilities would enhance theoretical precision, clarifying how organizations reconfigure themselves to achieve long-term adaptability, with Agile methods often tailored to specific contexts (Hron and Obwegeser, 2022; Hutter et al., 2025).

In addition, cross-disciplinary collaboration between management and organizational behavior research could foster the development of new conceptual models that connect structural, methodological, and human factors. For instance, management-oriented studies on large enterprise portfolios show that sustaining agility across multiple projects often relies on integrated governance and strategic alignment mechanisms, as highlighted by Suárez-Gómez and Hoyos-Vallejo (2025). Furthermore, Kreye et al. (2025) suggest that Agile practices and traditional organizational structures co-evolve through a process of mutual adaptation. In this process, methods are continuously reinterpreted and adjusted to fit existing structures, emphasizing the role of learning and how people gradually adjust their working ways, a topic typically addressed in organizational behavior research.

Such approaches can assess the robustness of current theoretical assumptions and contribute to the development of multi-dimensional frameworks that explain how large organizations build, sustain, and evolve agility as a lasting organizational capability.

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