

Portfolio Management In Large Scale Agile Software Development

By

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Abstract

As organisations scale agile software development across concurrent teams, the governance problems shift upward. Team-level agility cannot resolve what is, at root, a portfolio coordination problem: who decides which work gets done, in what sequence, with what resources, and against what strategic objectives? Traditional portfolio management models were designed for sequential, plan-driven delivery. They were not built for the iterative prioritisation, continuous investment decisions, and cross-team dependencies that large-scale Agile environments generate. The practitioner community has responded with a range of frameworks and guidance. The academic literature has not kept up: the evidence base for Agile Portfolio Management (APM) governance remains fragmented and considerably thinner than what practitioners have produced independently. This thesis investigates that gap.

The study used a Multivocal Literature Review (MLR), combining 23 white literature sources retrieved from four academic databases (Scopus, ACM Digital Library, IEEE Xplore, and EBSCO) with 18 grey literature sources such as practitioner frameworks, enterprise consulting reports, and professional guidance documents. Reflexive thematic analysis following Braun and Clarke (2019, 2021) produced 923 coded extracts and 16 merged themes, organised across four research questions (Braun & Clarke, 2019, 2021b).

Five themes explain why organisations adopt APM (RQ1): strategic alignment, adaptive empirical governance, resource and flow management, behavioural enablers, and Project Management Office (PMO) infrastructure. Where APM is absent (RQ2), two failure patterns dominate namely governance breakdown with strategic drift, and structural fragmentation with coordination failure which account for 127 coded extracts. Three barrier types block the transition from traditional Project Portfolio Management (PPM) to APM (RQ3): political, cultural, and leadership resistance (the most prominently evidenced, at 48 extracts); structural and scalability constraints; and financial and capability gaps. The RQ4 evidence suggests that effective APM at scale draws on six governance components working in combination:: adaptive steering mechanisms, institutional architecture and PMO roles, decentralised team autonomy, portfolio visibility and financial governance, stakeholder engagement routines, and interdependency management.

The study makes three contributions to the academic literature. First, the analysis identifies an adoption paradox: organisations that most need APM governance are often the least positioned to adopt it. Second, the RQ2-to-RQ4 challenge-solution correspondence, surfaced through systematic thematic synthesis of 923 coded extracts from 41 sources, yields a diagnostic-prescriptive framework. Third, the evidence suggests that APM governance is better framed as an organisational capability than as a methodology selection. Portfolio managers can use the framework to sequence governance investments against their specific needs and organisational context.

Keywords: Agile Portfolio Management, portfolio governance, large-scale software development, Multivocal Literature Review, scaled Agile, project portfolio management, adoption paradox.

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Attestation of Authorship

I hereby declare that this submission is my own work and that, to the best of my knowledge and belief, it contains no material previously published or written by another person (except where explicitly defined in the acknowledgements), nor used artificial intelligence tools or generative artificial intelligence tools (unless it is clearly stated, and referenced, along with the purpose of use), nor material which to a substantial extent has been submitted for the award of any other degree or diploma of a university or other institution of higher learning.

03/07/2026

Signature

Date

Artificial intelligence Declaration

Artificial Intelligence Guidelines:

Artificial Intelligence (AI) tools, including generative AI tools approved for use by AUT ([AI Tool Register](#)), can be used as learning tools when preparing to write your research proposal or research component. AI tools also have capability to assist with data modelling, data analysis and data visualisation. However, the research component you submit for examination must be substantively your own work. AI tools cannot solely be used to generate content when writing or creating an artwork/artefact, as this constitutes plagiarism. The formal guidelines for appropriate use of AI on the [AI Hub](#) must be followed. Also refer to the [Using Artificial Intelligence in your Research: Self-Assessments, Checklists, and Sample Text](#), for examples and sample text.

If you do plan to use AI tools, this declaration should be submitted with the initial research proposal, Confirmation of Candidature, and when you submit your research component for examination. You must complete the template below for each AI output used detailing the following:

- Chapters where AI was used in any way
- Purpose of AI Use
- AI Tool(s) Used
- Prompts Used
- Post-AI Processing Methods

Specify the chapter number(s) in your research proposal/research component where AI was used.	
Chapter number(s):	All chapters mainly chapter 4 and 5
Briefly explain why the AI tool was used (e.g., idea generation, summarization, data analysis, image creation, etc.).	
Purpose of AI Use:	Data analysis and synthesis support for the Multivocal Literature Review, primarily in Chapters 4 (Findings) and 5 (Discussion): assisting with checking and consolidating coded theme data, tabulating white/grey literature (WL/GL) counts and ratios, and reviewing draft synthesis narratives for consistency. Checking if there is any discrepancy between different chapters due to human errors. Help in generating graphs based on the data provided in chapter 4 and 5
Clearly state the AI tools used.	
AI Tool(s) Used:	Claude (Anthropic)
Prompts or queries entered into the AI tool (only the instructive portion of the prompt is required). Include all relevant variations.	

Prompts Used:	Chapter 4 (Findings) – e.g. “Given these coded extracts under Theme X, check whether the theme name and description still capture the full range of codes, or if it should be split/renamed”; “Calculate the GL:WL ratio for this merged theme and flag any inconsistency with the totals in the audit trail”; “Review this draft narrative synthesis paragraph for Theme X – does it clearly show where WL and GL evidence converge and diverge?” Chapter 5 (Discussion) – e.g. “Summarise the RQ3 and RQ4 findings from Chapter 4 into a comparison table showing WL codes, GL codes, and GL:WL ratio”; “Help draft a paragraph interpreting why RQ4 has the highest GL-dominance and what that might imply for practitioners vs. researchers”; “Check that Table 5.1’s totals match the underlying per-RQ figures reported in Chapter 4.”
<i>A summary or description of the AI-generated output. (Optional: attach output in an appendix.)</i>	
Output Received:	Chapter 4: consistency checks and suggested refinements to theme names/descriptions, and calculated GL:WL ratios cross-checked against the audit trail. Chapter 5: draft comparison/summary tables of RQ findings (e.g. Table 5.1) and draft interpretive paragraphs linking WL/GL patterns to implications for practitioners and researchers.
<i>Describe how the AI output was used, edited, or transformed.</i>	
Post-AI Processing Methods:	AI output was used only as a starting point. All outputs were checked against the underlying data, and substantially reviewed, edited, and rewritten by the researcher before inclusion in the thesis.

STUDENT DECLARATION			
<i>By signing you are confirming that the AI use stated in the table(s) above are accurate and follow AUT’s recommended guidelines detailed in the AI Hub and Postgraduate Handbook.</i>			
Student Name:	Sambreen Saleh	Signature:	Date: 03/07/2026

In memory of my parents, and of Camille.

Dad, this one is for you.

You always believed I would do this. I hope I have made you proud.

*Camille, thank you for standing beside me through every challenge of this journey. This
one is for you too.*

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This work is as much yours as it is mine.

Chapter 1 Introduction

1.1 The Problem This Thesis Addresses

In 2017, as Hoffmann and colleagues reported, a financial company from Europe which had 74 concurrent Agile teams created a study of its internal portfolio, and found out that about 61 percent of live projects were marked as “top priority” by at least one of the executive leaders. The result of that appropriate distribution was known to have arisen just through political influence instead of high-level impact. Project milestones became erratic, plus the organization’s ability to answer realistic market shifts collapsed (Hoffmann et al., 2020). The firm designed the Agile teams based on their technical and professional dimensions. The missing competency was Agile Portfolio Management.

This governance problem is not confined to a single organisation. Large-scale software firms routinely encounter coordination challenges that team-level Agile practices alone cannot resolve (Dingsøyr et al., 2018). Whenever several Agile groups are doing their job at the same time, everyone pulls tasks from the backlog of work and draws daily conclusions based on their priority. A challenging question that needs to be asked in this situation is: are all these teams collectively building what the organization actually needs? And are they doing so in a way that makes efficient use of shared resources? These questions are the foundation of Agile Portfolio Management (APM), and it sits at the intersection of two bodies of practice that have historically operated largely independently: strategic portfolio management and Agile software delivery (Dikert et al., 2016).

This study looks into APM management particularly, what are the governance structures, governance framework, decision making processes and standard routines required to be able to plan a successful portfolio level administration in huge Agile software development firms, and what the existing research studies that talk about the necessity for APM, the possible problems in its absence and the obstacles if APM is implemented. This research is motivated by a systematic gap in the evidence base: rigorous, empirically grounded accounts of how portfolio governance actually operates in large-scale Agile settings remain scarce, and the academic literature lags substantially behind practitioner expertise (Aghajani et al., 2023; Stettina & Hörz, 2015).

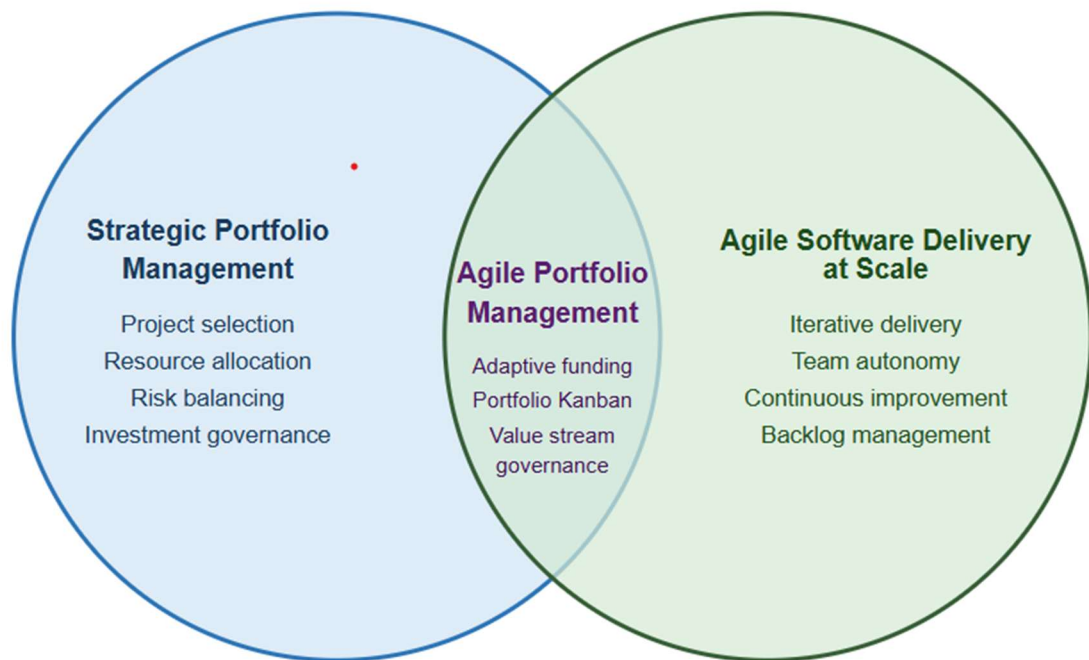
What makes this problem particularly difficult is that practitioner frameworks such as SAFe Lean Portfolio Management and PMI Disciplined Agile have moved far ahead of academic

research, offering detailed governance blueprints without robust empirical grounding. Whether these frameworks represent evidence-based practice or codified convention is precisely the question this thesis addresses. The consequences of operating without portfolio governance, resource misallocation, strategic drift, and coordination debt are documented in the literature and examined in Chapter 4.

What remains poorly understood is how organisations navigate these governance challenges in practice, what effective portfolio governance looks like across different contexts, and whether SFAF Lean Portfolio Management and PMI Disciplined Agile represent genuine evidence-based practice or simply codify existing convention (“Lean Portfolio Management,” n.d.; *The Disciplined Agile® (DATM) Tool Kit*, n.d.).

Figure 1-1 maps the conceptual territory this thesis occupies. Strategic Portfolio Management (left) brings the governance logic of project selection, resource allocation, and investment oversight; Agile Software Delivery at Scale (right) brings iterative delivery, team autonomy, and continuous improvement. Agile Portfolio Management sits in the overlap, combining adaptive funding, portfolio Kanban, and value stream governance in ways that neither tradition alone provides. The overlap shows why APM cannot be fully captured by either tradition alone.

Figure 1-1
Agile Portfolio Management at the Intersection of Two Disciplines



Note. Conceptual diagram showing APM at the intersection of Strategic Portfolio Management and Agile Software Delivery at Scale. Based on (Stettina & Hörz, 2015) and (Knaster & Leffingwell, 2020)

1.2 Background and Research Context

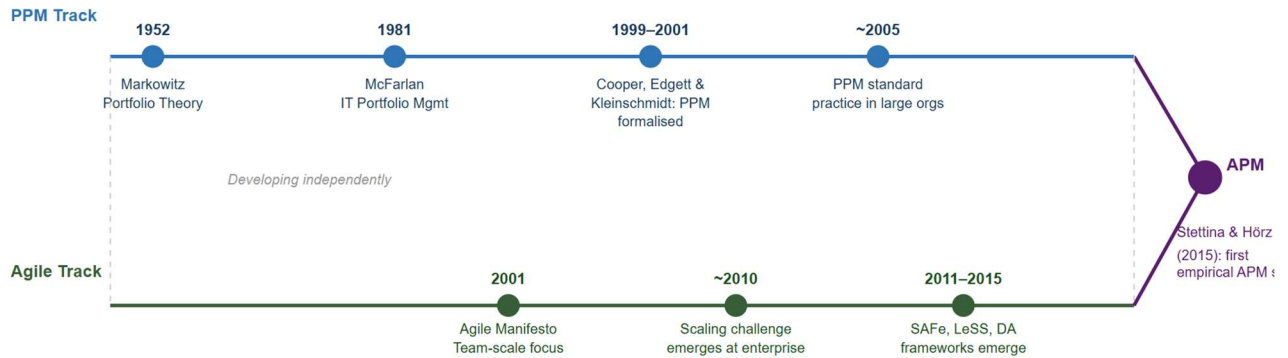
The gap between practitioner sophistication and academic understanding of APM is the structural motivation for this thesis and for the Multivocal Literature Review (MLR) as its research method. Chapter 2 develops the intellectual lineages of both PPM and Agile in full and traces their convergence into the APM problem space.

Figure 1-2 provides the summary of the history of the two traditions that converge in APM as described above. The upper track shows the PPM lineage from Markowitz's (1952) financial portfolio theory through McFarlan's (1981) IT investment framing to the formalisation of project portfolio management by Cooper, Edgett, and Kleinschmidt (1999, 2001). The lower track shows Agile's rapid spread from the 2001 Agile Manifesto through the emergence of enterprise scaling frameworks from approximately 2011 onwards. The two tracks converge at the point where Agile adoption at scale created governance demands that team-level methods could not address. Stettina and Hörz (2015) mark an early

systematic empirical examination of APM practice at that convergence point, and it is where this research begins.

Figure 1-2

Parallel Evolution of Portfolio Management and Agile Traditions, Converging in APM



Note. Timeline of the parallel development of Project Portfolio Management and Agile methodologies converging in Agile Portfolio Management. Sources: Markowitz (1952); McFarlan (1981); Cooper et al. (1999, 2001); Beck et al. (2001); Stettina & Hörz (2015).

1.3 Theoretical Positioning

This thesis draws on two converging bodies of literature: governance-focused PPM research examining portfolio selection, prioritisation, and resource allocation under uncertainty (Barclay & Osei-Bryson, 2010; Hoffmann et al., 2020; Martinsuo et al., 2022; Petit, 2012), and empirical work on Agile portfolio practice in large-scale organisations (Aghajani et al., 2023; Stettina & Hörz, 2015). Together, these streams frame the governance gap the thesis investigates; Chapter 2 develops the full conceptual and historical context.

The thesis adopts an interpretive research paradigm, since knowledge about APM governance is socially constructed rather than derivable from controlled measurement (Fitzgerald & Howcroft, 1998). How organisations govern Agile portfolios depends on context, culture, and experience accumulated in the field and it is not a fixed technical system that behaves the same way across different organizations and environments. A significant part of that accumulated experience never makes it into peer-reviewed literature. It circulates instead as vendor guidance, consultant reports, framework documentation, and practitioner conference papers. Taking the practitioner’s knowledge seriously, rather than treating formal publication as the only source of truth, is a deliberate choice this thesis makes. The MLR methodology is built for exactly this kind of domain. Chapter 3 sets out the methodological rationale and the quality protocols applied to both literature streams.

1.4 Research Aim and Questions

This research focuses and synthesises the academic and practitioner literature on Agile Portfolio Management in large-scale software development organisations to produce a consolidated, evidence-based set of findings of the APM field. The research maps the need for APM, the consequences of its absence, the barriers to its adoption, and the governance mechanisms that support effective strategic alignment.

Table 1-1 summarises the research questions. Chapter 4 reports the findings for each question.

Table 1-1

Research questions and corresponding thesis chapters

RQ	Research Question	Addressed in
RQ1	What is the need to adopt portfolio management in large-scale Agile software development?	Chapter 4
RQ2	What are the challenges that large-scale organizations face in the absence of Agile Portfolio Management?	Chapter 4
RQ3	What are the barriers that stop organizations from implementing PPM?	Chapter 4
RQ4	What specific governance structures, roles, and decision-making processes within Agile Portfolio Management support continuous alignment with evolving business objectives?	Chapter 4

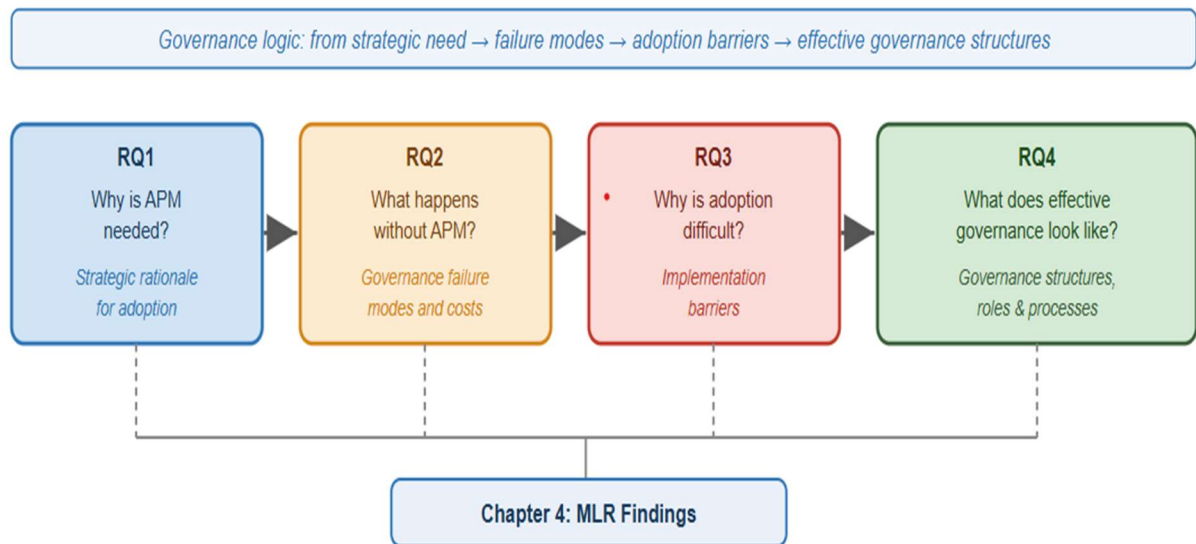
Figure 1-3 shows the governance logic connecting the four research questions. The RQs form a deliberate sequence rather than four independent inquiries: establishing why APM is needed (RQ1) before examining what happens in its absence (RQ2), identifying why adoption is difficult despite the evident need (RQ3), and asking what effective governance looks like in the evidence base (RQ4). RQ4 only makes sense once RQ1, RQ2, and RQ3 have been worked through which is why the sequence runs from need and failure through barriers before arriving at governance solutions. All four questions are addressed through integrated MLR synthesis in Chapter 4.

Each question follows from a gap in the prior work reviewed in Chapter 2 (Section 2.6). RQ1 asks about the need for APM because the frameworks that promote it have limited empirical support (Aghajani et al., 2023; Stettina & Hörz, 2015). RQ2 and RQ3 ask about the consequences of its absence and the barriers to adoption, which earlier studies address

separately (Ajjan et al., 2013; Hoffmann et al., 2020). RQ4 asks which governance structures, roles, and decision-making processes the evidence supports, because the designs in SAFe and PMI Disciplined Agile have limited empirical grounding (Section 1.1).

Figure 1-3

Research question logic. Tracing a Governance Rational



Note. Flow diagram illustrating the logical sequence of the four research questions from strategic need (RQ1) through governance failure (RQ2) and adoption barriers (RQ3) to effective governance structures (RQ4). RQ = Research Question.

1.5 Research Significance

The contributions of this study are theoretical and practical.

The study uses a Multivocal Literature Review (MLR), a method suited to fields where practitioner knowledge exceeds academic knowledge, as in APM (Garousi et al., 2019). The method combines peer-reviewed and grey literature streams under separate quality criteria and is set out in Chapter 3.

Theoretically, the thesis synthesizes how governance structures, roles, and decision-making processes are characterized across both academic and practitioner sources. Single-stream studies such as those by Aghajani et al. (2023), Martinsuo et al. (2022) and Stettina and Hörz (2015) do not draw on both. Combining the two streams allows patterns and tensions to be identified that may not be visible in either stream alone.

For practitioners, this research provides IT programme and portfolio managers with a consolidated, critically evaluated evidence base for APM governance decisions. It may also help to address gaps left by prescriptive frameworks such as SAFe and PMI DA. Chapter 6 discusses the implications for practice in full.

1.6 Scope and Delimitations

This study focuses on APM governance in large-scale software development organisations. An organisation is considered large-scale when it operates several concurrent Agile teams and typically employs more than 250 people, consistent with criteria used in the APM literature (Stettina & Hörz, 2015). This guided the screening of study settings. It could not be checked for every source, and Section 3.4.2 explains how sources that do not report it, or do not meet it, were treated. The geographic scope of the source literature is global, reflecting the international character of the APM body of knowledge.

The research focuses on governance structures, processes, roles, and decision-making at the portfolio level. Team-level Agile practices and individual project governance are addressed only insofar as they are shaped by or feed into portfolio-level governance decisions. The research does not evaluate specific APM frameworks (SAFe, DA, LeSS) as products; it examines governance practice as documented in the literature, which may or may not involve those frameworks.

This thesis is not about trying to create a prescriptive best-practice framework. The existing grey literature provides wide-range standard procedures. This research's goal is to provide the organized, high-level methodology of the evidence base that at the moment, may or may not support APM management practice and working-ideas.

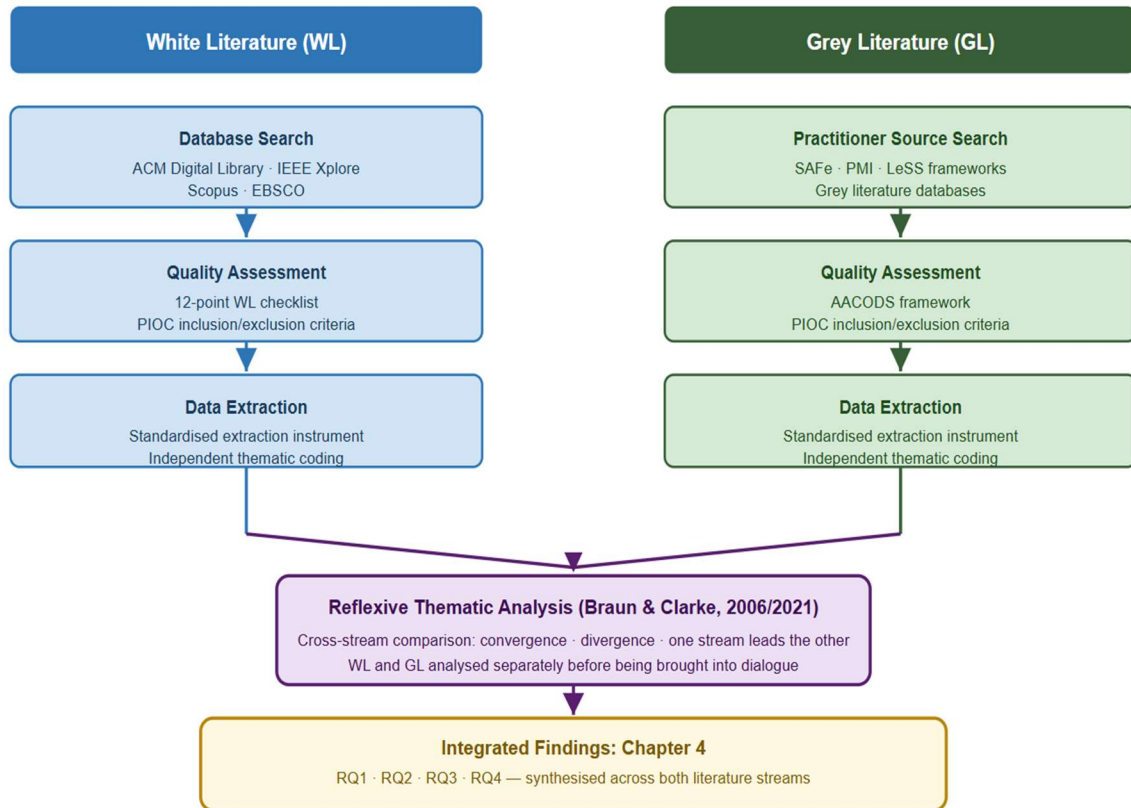
1.7 Research Approach

Research always rests on philosophical assumptions about what counts as knowledge and how it can be reached. The research adopts an interpretivist philosophical stance. As APM governance involves human judgement, negotiation, and political choice, making interpretive sense-making more analytically appropriate than controlled measurement. This philosophical position and its implications for the research design are justified in full in Chapter 3.

The research method used for this study is a Multivocal Literature Review (MLR), which combines peer-reviewed academic literature with practitioner grey literature and it is appropriate for a domain where practitioner knowledge has substantially outpaced the academic evidence base. The full MLR protocol, quality assessment criteria, and data synthesis procedures are documented in Chapter 3.

Figure 1-4 shows how the MLR is structured. White Literature is retrieved from academic databases (ACM Digital Library, IEEE Xplore, Scopus, and EBSCO); Grey Literature is gathered from practitioner repositories and framework documentation. Both streams are screened and quality-assessed separately using different but comparably rigorous criteria: a 12-point checklist for White Literature and the AACODS framework for Grey Literature (Garousi et al., 2019). Both literatures were then brought into discussion through Reflexive Thematic Analysis (Braun & Clarke, 2021a). The cross-stream comparison where academic and practitioner evidence converge, diverge, or where one leads the other is what makes the MLR distinctive as a research method.

Figure 1-4
MLR Dual Stream Research Process



Note. Process diagram showing the Multivocal Literature Review methodology with parallel White Literature and Grey Literature streams converging through Reflexive Thematic Analysis. Based on (Garousi et al., 2019) and (Braun & Clarke, 2006, 2021b).

1.8 Researcher Positionality

In interpretive research, the researcher is the analytical instrument rather than a neutral observer, and making that position explicit is part of what gives the analysis its credibility (Linda Finlay, 2002). As a practitioner with experience delivering large-scale Agile programmes, my positional awareness shapes the analytical lens. This positionality and its implications for analytical rigour are documented explicitly in Chapter 3.

1.9 Thesis Structure

The thesis chapters follow a logical progression from problem framing through methodological justification and evidence synthesis to interpretation and conclusion. **Table 1-2** provides a chapter-by-chapter overview.

Table 1-2
Thesis Structure Overview

Chapter	Title	Content
Chapter 1	Introduction	Introduces the research problem by tracing the governance gap that emerges when Agile methods operate at portfolio scale. Sets out the four research questions, the theoretical positioning within PPM and APM governance scholarship, and the interpretivist philosophical stance underpinning the study. Defines scope, documents researcher positionality, and outlines the thesis structure.
Chapter 2	Background and Theoretical Framework	Traces the intellectual lineages of Project Portfolio Management and Agile methodologies, examining how their convergence creates the governance problem this thesis addresses. Reviews the governance-focused strand of PPM scholarship and the emerging body of empirical APM research. Establishes the conceptual vocabulary such as governance structures, decision rights, roles, and accountability mechanisms used to organize the findings in Chapter 4.
Chapter 3	Research Methodology	Provides justification that the Multivocal Literature Review as the appropriate method for a domain where practitioner knowledge substantially exceeds what is available in peer-reviewed sources alone. Documents the full MLR protocol: search strategy across four academic databases and structured grey literature sources; PIOC-based inclusion and exclusion criteria; dual quality assessment using a 12-point checklist for White Literature and the AACODS framework for Grey Literature; and Reflexive Thematic Analysis as the data synthesis approach.
Chapter 4	Findings	Presents the MLR findings thematically across all four research questions, drawing on both White and Grey Literature streams. Each theme is reported with source attribution and cross-stream analysis, identifying where academic and practitioner evidence converges, diverges, or where one leads the other. The findings provide direct answers to all four research questions.
Chapter 5	Discussion	Interprets the findings in relation to the PPM and APM governance literature, identifying what the evidence collectively supports regarding governance practice and its foundations. Addresses the research gaps revealed by the synthesis and articulates the theoretical and practical contributions of the thesis.
Chapter 6	Conclusion	Summarizes the key findings and contributions, revisiting each research question in turn. Reflects on the limitations of the MLR approach and the boundaries of what the findings can claim. Identifies directions for future empirical research, particularly primary studies that could test or extend the governance frameworks identified in Chapter 4.

1.10 Chapter Summary

Portfolio Project Management (PPM) and Agile methods developed from different backgrounds. PPM was influenced by financial portfolio theory (H. Markowitz, 1952; H. M. Markowitz, 1999) and IT investment governance (McFarlan, 1981). Agile, on the other hand, emerged from the Agile Manifesto, which was designed for small, co-located teams working in fast-changing environments (Beck et al., 2001). As Agile practices became more widely adopted in large organisations, tensions began to emerge between Agile ways of working and traditional portfolio management approaches. This tension forms the main focus of this thesis. Although practitioner frameworks such as SAFe and PMI Disciplined Agile have attempted to address portfolio-level Agile governance, there is still limited empirical evidence supporting these approaches (Aghajani et al., 2023; Stettina & Hörz, 2015).

The four research questions address the need for Agile Portfolio Management (APM), the consequences of its absence, the barriers to its adoption and the governance structures that support it.

This research adopts an interpretivist perspective because the way organisations govern Agile portfolios is shaped by their context, culture and accumulated experience (Fitzgerald & Howcroft, 1998; Orlikowski & Baroudi, 1991). A Multivocal Literature Review (MLR) was used to include practitioner publications and industry reports alongside academic sources (Garousi et al., 2019). The AACODS framework was applied to assess the quality and credibility of the grey literature (Garousi et al., 2019).

Although Chapter 1 introduced the concepts of PPM and APM, Chapter 2 provides the conceptual and historical background to the research problem. This discussion provides the foundation for understanding the research problem and supports the selection of the Multivocal Literature Review methodology, which is explained in Chapter 3.

Chapter 2 Background and Theoretical Framework

2.1 Introduction

The conceptual and theoretical foundations of the study will be established in this chapter. The analytical framework draws on two interrelated bodies of knowledge: the beginning and development of Project Portfolio Management (PPM) and the path of Agile methods from small-team practice to enterprise-scale management. The explanation of why these traditions was significant to Agile Portfolio Management will be discussed, both in large-scale development and the reasons why the governance today demands thorough review and investigation.

Section 2.2 traces the conceptual lineage of PPM. Section 2.3 examines the governance challenge created by scaling Agile, and Section 2.4 the scaling frameworks and their portfolio-level provisions. Section 2.5 reviews empirical evidence on APM in practice and compares earlier reviews and models with this thesis. Section 2.6 integrates the two bodies of literature into the framework that guides the analysis in this thesis.

This investigation is directly relevant to modern software development practice. Large-scale Agile adoption accelerated significantly from 2010 onward (Dikert et al., 2016; Knaster & Leffingwell, 2020; Scaled Agile, Inc, 2023), with growing numbers of organisations running multiple Agile teams requiring consolidated portfolio oversight. Some conceptual developments to PPM were made from a manufacturing and product developing background where annual planning cycles and defined set of requirements are operationally feasible. The application of those requirements forced large-scale companies to go through difficult testing of the basic principles.

This chapter does not review all PPM or Agile literature; the MLR findings are reported in Chapter 4 and discussed in Chapter 5. The chapter concentrates on the governance gaps that appear when Agile principles are applied at portfolio level. Sections 2.2 to 2.5 each include a short synthesis of the studies they discuss, and Section 2.6 draws these together into the gaps that the four research questions address.

2.2 Project Portfolio Management: Foundations and Evolution

Financial economics are the intellectual foundation of portfolio management. By demonstrating the mean variance, (H. Markowitz, 1952), introduced the model of portfolio selection, showing that investment decisions must not be tested in isolation but in terms of their collective contribution to

the portfolio, specifically the trade-off between expected return and variance across the full set of holdings.

The central insight, that the value of an individual investment cannot be assessed independently of the portfolio risk-return profile to which it belongs, proved generative well beyond its original financial domain and established the intellectual precedent for all subsequent portfolio management theory. In modern APM, individual investment cannot be assessed independently; it belongs to the overall portfolio productive content. The framework built by Markowitz that persists in modern APM has two principles which optimizes components only; and risks that must be assessed at the portfolio level not by individual resource capacity(H. Markowitz, 1952).

In a 1981 Harvard Business Review article, (McFarlan, 1981) is the first to apply portfolio management regarding IT investment decisions, that IT organizations need to handle their own IT projects mix as a portfolio that is active and coordinated rather than case by case evaluation and implementation of projects. The concept of “IT portfolio risk profile” was introduced by McFarlan distinguishing between projects that were operationally necessary, strategically transformative, or exploratory, each requiring different governance treatment. This switched the concentration from improving single IT projects to improving the overall value of all IT software improvement. It also made strategic goal alignment more important than financial return alone when evaluating the portfolio (McFarlan, 1981).

Applying portfolio thinking to IT investment was more than just using a financial analogy(McFarlan, 1981). McFarlan's (1981) foundation work showed that financial and IT portfolios are similar because both involve deciding how to use limited resources across competing projects with uncertain outcomes, complex connections, and trade-offs between short-term results and long-term growth. This similarity helped PPM remain useful across different industries and disciplines. By the late 1990s, PPM had expanded from IT strategy into areas such as product development, infrastructure planning, research and development, and wider project governance (Archer & Ghasemzadeh, 1999; Cooper et al., 1999). Although these fields adapted the concept in different ways, the main idea stayed the same: organisations should manage projects as a complete portfolio rather than focus only on individual projects in isolation.

Building on this work, Archer and Ghasemzadeh (1999) developed an integrated PPM framework that gave equal importance to strategic alignment, resource balance, and risk management in portfolio decisions (Archer & Ghasemzadeh, 1999). Their framework introduced a project screening

process, where projects were assessed against strategic and technical criteria before resources are approved, and portfolio-level comparison to make sure the overall portfolio stayed balanced instead of simply including attractive individual projects. This contribution is significant for APM because it established that portfolio governance is not merely about selecting the best individual initiatives but about managing the interdependencies, risk distribution, and strategic coherence of the portfolio as a whole.

Cooper, Edgett, and Kleinschmidt (1999, 2001) later developed portfolio management into a recognised management approach for new product development (Cooper et al., 1999, 2001). They explained that PPM has three main goals:

- maximising value by achieving the best return on investment
- maintaining a balanced mix of strategic, tactical, short-term and long-term projects,
- and ensuring projects support organisational strategy rather than being influenced by politics or past habits.

They also reported that organisations using formal PPM achieved higher success rates in new product development, although a comparison of this kind shows association and not cause (Cooper, 2011).

Cooper, Edgett, and Kleinschmidt also introduced the idea of portfolio balance, explaining that a good portfolio needs a mix of different types of projects, risks, and time-frames. If a company focuses too much on small, short-term projects, it may perform well now but miss out on important long-term innovations which are necessary for competitive survival. If it focuses too much on ambitious transformational, large and complex, risky projects without sufficient incremental funding to maintain current revenue streams that may hurt its current financial stability. They argued that keeping this balance is just as important as maximising profit from individual projects (Cooper et al., 1999, 2001). This creates a challenge for large Agile organisations, because fast delivery cycles can make it harder to manage and track long-term balance across the portfolio. Portfolio balance, in this formulation, became a governance objective of large-scale organizations. This tension between optimisation and balance remains one of the central governance dilemmas that large-scale Agile organisations must navigate, since Agile delivery cadences can make multi-year portfolio balance particularly difficult to achieve or monitor (Knaster & Leffingwell, 2020; Stettina & Hörz, 2015).

Dye and Pennypacker (2000) extended the portfolio selection criteria beyond financial returns alone, arguing that organisations should also evaluate how well a project fits their strategy, the value it

delivers to stakeholders, and the level of risk involved (Dye & Pennypacker, 2000). This multi-criteria selection logic reinforced a principle already implicit in Markowitz's original framework which is that optimising individual components does not optimise the portfolio as a whole, and risk must be assessed at the portfolio level.

Killen, Hunt, and Kleinschmidt (2008) provided empirical confirmation of PPM's strategic impact across 60 Australian organisations spanning service and manufacturing industries. Their study found a strong correlation between PPM performance and new product success rates, and showed that high-performing organisations tend to use PPM to guide executive-level decisions, helping them align projects with strategy and use resources more effectively than organisations that do not (Killen et al., 2008).

Robert G. Cooper (2011) extended this research by demonstrating that formal portfolio management processes alone are not sufficient for sustained performance. Organisations also need the ability to learn from past portfolio decisions and continuously improve how they manage and select projects over time (Cooper, 2011). This portfolio management learning capability is the organisational ability to improve decision quality through systematic retrospection and is as important as the governance processes themselves.

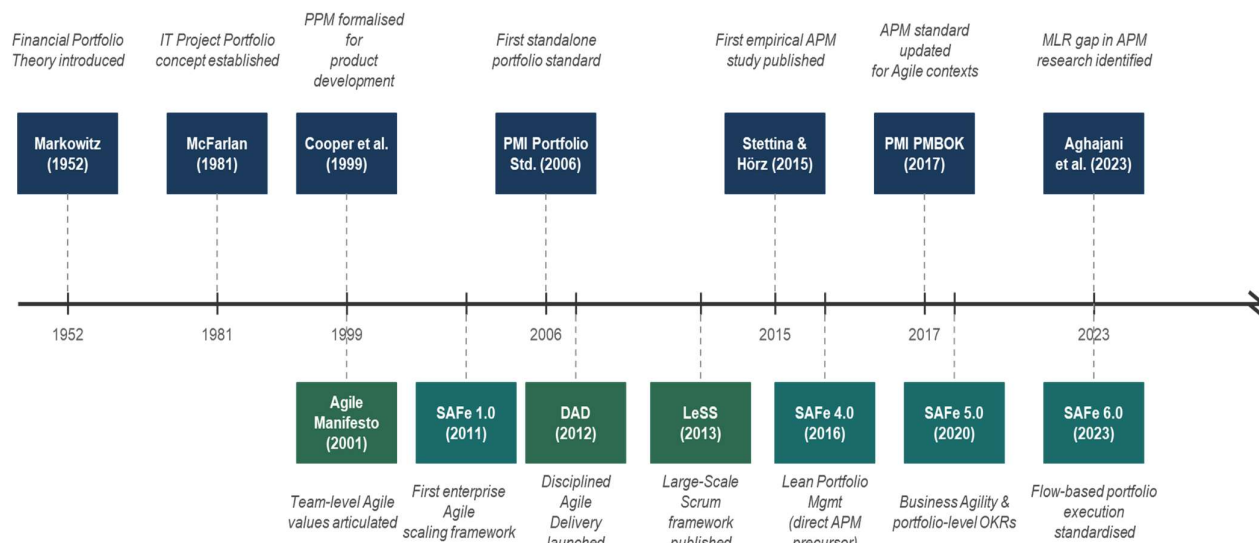
The Project Management Institute (PMI) formalised PPM into a professional standard, defining Project Portfolio Management as "the centralised management of one or more portfolios to achieve strategic objectives" (Project management Institute, 2017). It also explains three levels of management. Portfolio management selects and prioritises projects to meet overall organizational strategy. Programme management coordinates related projects to deliver combined benefits. Project management focuses on delivering a single project outcome. This three-level hierarchy (portfolio, programme, project) is central to understanding why scaling Agile to enterprise contexts requires portfolio governance (Project Management Institute, 2017) because Agile was originally designed for individual projects, so managing many teams together requires a different, higher-level way of governing work (Knaster & Leffingwell, 2020).

Figure 2-1 maps this trajectory from Markowitz (1952) to Aghajani et al. (2023). The timeline runs two threads in parallel. Dark blue boxes track the academic and professional milestones that built PPM as a field. Green boxes track the Agile scaling frameworks, principally SAFe, that addressed portfolio governance from a practitioner angle. The split tells its own story: PPM concepts took shape through academic and standards channels between 1952 and 1999, and then a largely separate

body of practitioner work grew up around the governance problems that Agile adoption created from 2001 onward.

Three points on the timeline matter most for this thesis. SAFe 4.0 (2016) is where Lean Portfolio Management appeared as a formal layer within the framework, bringing portfolio Kanban, value-stream budgeting, and rolling-wave investment decisions into practitioner use (Leffingwell, 2016). That body of practice is the direct precursor to the governance mechanisms this study examines in RQ4 and synthesizes in Chapter 5. Stettina and Hörz (2015) then provided the first empirical account of what APM governance actually looked like in organizations, finding that most were adapting their existing PPM processes rather than replacing them (Stettina & Hörz, 2015).

What the timeline also shows is a consistent lag between what practitioners were doing and what academics were studying. SAFe 1.0 came out in 2011 (Boswell, 2025); the first serious empirical look at APM governance came four years later with (Stettina & Hörz, 2015). LPM arrived in SAFe 4.0 in 2016 (Leffingwell, 2016); systematic reviews of agile portfolio management followed from 2021 (Batista et al., 2022; Puthenpurackal Chakko et al., 2021), and a multiple case study of success factors in large organizations followed in 2023 (Aghajani et al., 2023). That gap is not surprising given the differences in publication timelines between grey literature and peer-reviewed journals, but it does have practical consequences for researchers trying to understand what works in practice. It is the main reason this study uses a Multivocal Literature Review rather than a conventional systematic review: treating practitioner documentation and academic research as equally valid sources of evidence about APM governance, rather than defaulting to one at the expense of the other.

Figure 2-1*Evolution of Project Portfolio Management (1952–2025).**Key milestones from financial portfolio theory through to contemporary APM research.*

A key limitation of traditional PPM literature is that it assumes that projects are clearly defined with fixed scope, start and end dates. In this model, portfolio management is mainly about choosing which projects to start, continue, or stop (Stettina & Hörz, 2015). Agile development does not work this way. Agile teams often work on ongoing products or capabilities that do not have a clear end date, so funding is more continuous rather than tied to a single project that eventually closes (Knaster & Leffingwell, 2020). Dye and Pennypacker (2000) partly recognised this difference by separating project and programme portfolios, but the idea was not fully recognized in academic literature and was largely ignored in later standards (Dye & Pennypacker, 2000). The Project Management Institute (2017) also notes that portfolios can include projects, programmes, and other work, but it does not clearly explain how to manage ongoing Agile product funding in practice. This conceptual gap is a core motivation for this thesis (Project Management Institute, 2017).

Read together, the studies in this section share one principle and differ in what they ask portfolio management to achieve. From Markowitz (1952) to the PMI standard (Project Management Institute, 2017), projects are judged by their contribution to the whole portfolio and not in isolation. The selection criteria widen over time: Markowitz addresses risk and return, McFarlan (1981) applies a risk profile to IT investment, Archer and Ghasemzadeh (1999), Cooper et al. (1999, 2001) and Dye and Pennypacker (2000) add strategic fit and balance, and Cooper (2011) adds learning from past portfolio decisions. Two limits follow for this thesis. The empirical support cited in this section comes

from new product development and cross-industry samples (Cooper et al., 2001; Killen et al., 2008), not from studies of software organisations using Agile methods, and the models assume projects with fixed scope and end dates, which continuous Agile product funding does not have.

2.3 The Governance Challenge of Large-Scale Agile

Agile methods were developed as a reaction against the limitations of plan-driven software development. The Agile Manifesto (Beck et al., 2001) articulated four value priorities (individuals and interactions over processes and tools; working software over comprehensive documentation; customer collaboration over contract negotiation; and responding to change over following a plan) and twelve supporting principles, all designed for small, co-located, self-organising teams. The governance assumptions embedded in these principles are explicit: autonomous teams with direct customer access, short empirical feedback cycles, minimal process bureaucracy, and emergent rather than prescribed solutions. Even if the said assumptions were not a coincidence, they are the foundation and heart to Agile approach to software implementation.

As Agile expanded across entire organisations, many of the assumptions that made it successful for small teams, were no longer true. What worked well for one small team became much harder to manage when organisations scaled to dozens or even hundreds of teams. This created several governance challenges that team-level Agile practices alone could not solve. The first challenge is managing dependencies between teams. In large Agile environments, teams often rely on shared platforms, APIs, services, and data. This creates a complex web of interconnections that requires coordination beyond the individual team level (Larman & Vodde, 2016). Without broader oversight, organisations can run into integration problems, conflicting priorities, and delays as teams struggle to stay aligned. The second challenge is resource competition. Resources such as infrastructure, specialist expertise, security support, and organisational capacity are limited, yet many teams may need them at the same time. Deciding which teams should receive priority requires portfolio-level decision-making. Without this, resource allocation can become influenced more by internal politics than by strategic goals (Vario, 2022). Knaster and Leffingwell (2020) refer to this as the “resource paradox”. In the absence of portfolio management, if every team claims to be the top priority, then no meaningful prioritisation is actually happening (Knaster & Leffingwell, 2020). The third challenge is strategic alignment. Agile teams usually manage their own delays and focus on local priorities, but this does not automatically ensure that all teams are working toward the organisation’s broader goals. Teams can become highly efficient in their own areas while still drifting away from overall business strategy. As a result, organisations need portfolio-level governance to connect team

delivery with enterprise strategy rather than expecting alignment to happen naturally (Stettina & Hörz, 2015).

See Appendix H for a full summary of governance challenges, their causes, manifestations, and corresponding portfolio management responses.

Empirical research is consistent with these challenges, although the evidence base is small. Stettina and Horz (2015) studied 14 large European organisations, 30 interviews and found that although most had introduced portfolio management with Agile, only a few (23%) considered their governance processes effective. The biggest problems discussed were teams constantly switching between projects, unclear use of resources, and the absence of a clear project priority plan. These issues made it difficult to connect organisational strategy with day-to-day delivery work. The study also showed that organisations with clear and structured Agile portfolio management performed better in aligning strategy with delivery. They were more predictable in achieving results than organisations relying on informal coordination (Stettina & Hörz, 2015). The study draws on interviews in European organisations, and the effectiveness figure is the organisations' own assessment.

Vähäniitty et al. (2010) explained that governance problems are not only faced by large companies. Small software firms also need proper project portfolio management (PPM) when they start running more than three or four projects at the same time. They argued that without formal portfolio management, small firms can experience the same coordination and management problems as large organisations, but much more quickly. Informal coordination may work for one team, but it becomes ineffective when several projects are competing for the same people and resources (Vähäniitty et al., 2010). This suggests that the challenge comes from managing several connected projects at once and not only from organisational size.

The timing difference between traditional governance and Agile ways of working is also a major challenge. Traditional portfolio management usually works around yearly budgets. Projects are planned, approved, and funded once a year, with only small changes made during review periods. Agile delivery works much faster, using two-week sprints, quarterly planning, and continuous updates to products and services. Because these two systems work at very different speeds, problems often happen. Annual portfolio reviews cannot respond quickly to changes that happen every few weeks in Agile teams. At the same time, Agile teams often feel that yearly budgeting processes are too slow and unclear. Conboy and Carroll (2019), in their study of challenges in implementing large-scale Agile frameworks, highlight this timing mismatch as a significant

governance problem. Organisations that address it by adopting quarterly rolling-wave reviews, where portfolio planning occurs every quarter rather than annually, report better strategic alignment outcomes (Conboy & Carroll, 2019). This gave organisations more flexibility to change priorities without having to completely redo their plans each time.

Sweetman and Conboy (2018) describe Agile project portfolios in a simple way as systems where everything is connected and constantly changing. It's not just a list of separate projects. The projects that are interconnected affect each other, and the overall result cannot always be predicted just by looking at each project on its own. This creates a challenge for management. If leaders try to control everything tightly, they can end up limiting the flexibility and creativity that Agile is supposed to bring. But if there is no real oversight and portfolio governance, things can go off track, with teams competing for resources, decisions becoming political, and work drifting away from the main goals (Sweetman & Conboy, 2018).

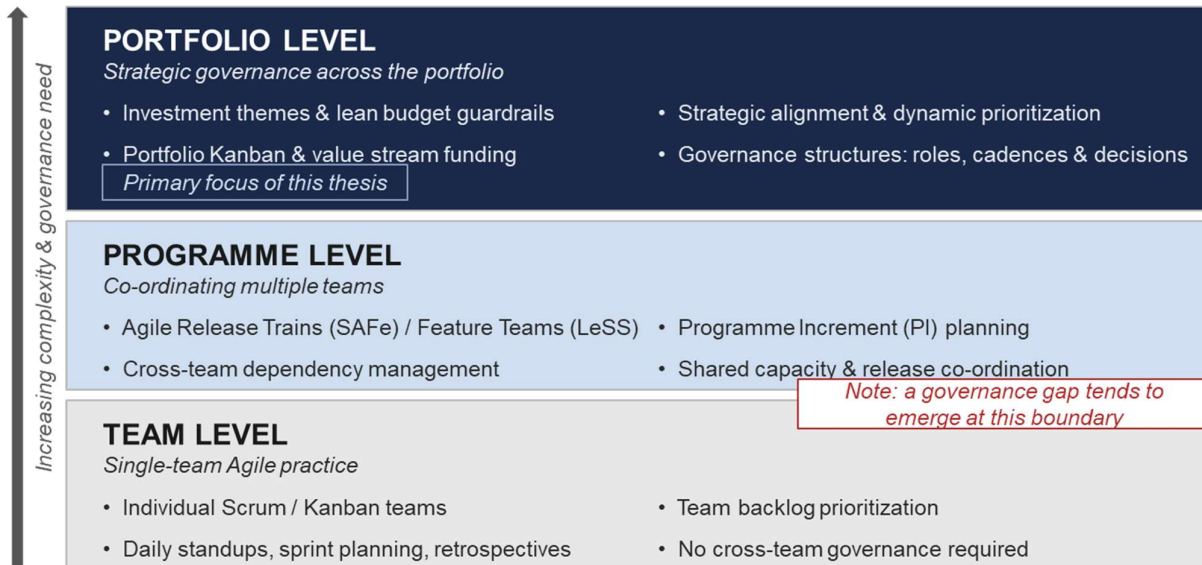
Figure 2-2 shows the three levels of governance in large-scale Agile organisations and the gap that appears when portfolio-level governance is missing. The three-tier structure has been created based on Leffingwell's (2011) original articulation of the Agile Enterprise Big Picture, which distinguished Team, Program, and Portfolio levels as the foundational architecture of large-scale Agile delivery (Leffingwell, 2011). Reading the diagram from bottom to top, each layer adds a new dimension of co-ordination and a correspondingly heavier governance requirement. The further up the organisation, the harder it becomes to rely on the informal mechanisms that work well at team level.

The Team Level is where Agile began. The Agile Manifesto (Beck et al., 2001) was written with self-organising, co-located teams in mind like teams that run Scrum or Kanban, manage their own backlogs, and largely sort themselves out. Cross-team governance does not feature at this level because it does not need to. The picture changes at the Programme Level, where multiple teams must work toward shared goals. Frameworks such as SAFe's Agile Release Trains (Knaster & Leffingwell, 2020) and LeSS Feature Teams (Larman & Vodde, 2016) were developed precisely to handle this. They align cross-team dependencies, co-ordinating Programme Increment (PI) planning, and managing shared release schedules. The focus at this level is delivery logistics, not strategic direction.

The Portfolio Level is where this thesis is principally concerned. At this level organisations must translate strategic directions into funded, prioritised work streams across all delivery work. SAFe's Lean Portfolio Management (LPM) competency (Knaster & Leffingwell, 2020; "Lean Portfolio

Management,” n.d.) defines the core mechanisms at this level. This level defines investment themes, lean budget guardrails, value stream funding, and Portfolio Kanban for managing the flow of strategic initiatives. These are decisions that team-level Agile was never designed to support, and they require governance structures that go well beyond what most organisations have in place when they first begin scaling (Knaster & Leffingwell, 2020).

Figure 2-2
Governance Maturity Model



Note: As organisations scale, a governance gap emerges that team-level practices cannot address. Adapted from (Knaster & Leffingwell, 2020; Larman & Vodde, 2016; Leffingwell, 2011).

The governance gap shown in the diagram sits at the boundary between the Team and Programme levels. This is where many organisations first run into trouble. Practices that work inside a single team do not transfer cleanly when cross-team dependencies, shared capacity, and strategic alignment enter the picture. Stettina and Hörz (2015) note that the empirical study of portfolio governance in practice remains limited, pointing to a gap between what scaling frameworks prescribe and what organisations actually enact (Stettina & Hörz, 2015). Knaster and Leffingwell (2020) put it plainly: one Scrum team needs no portfolio governance, but scale that to hundreds of teams and the absence of it becomes costly. That gap, between what team-level Agile was built to handle and what large-scale delivery actually demands, is the problem this thesis sets out to examine (Knaster & Leffingwell, 2020).

In these sources, the governance problem is linked not only to organisational size but also to the number of interdependent streams of work running at the same time (Larman & Vodde, 2016;

Vähäniitty et al., 2010) and to the mismatch between annual governance cycles and Agile delivery cadences (Conboy & Carroll, 2019). The sources differ in the kind of evidence they offer. Knaster and Leffingwell (2020) and Larman and Vodde (2016) are framework authors describing problems that their frameworks are designed to address. Stettina and Hörz (2015) and Conboy and Carroll (2019) report empirical studies, and Sweetman and Conboy (2018) describe portfolios as interconnected systems, which suggests why tighter central control may not resolve the problem. The empirical base for the governance gap in this section therefore rests on a small number of studies, which Section 2.5 examines further.

2.4 Enterprise Agile Scaling Frameworks at the Portfolio Level

To deal with the challenges of using Agile in large organisations, practitioners created different scaling frameworks that include ways to manage work at the portfolio level. The three most common ones are the Scaled Agile Framework (SAFe), Large-Scale Scrum (LeSS), and Disciplined Agile (DA). Each framework handles the balance between giving teams independence and keeping overall control and accountability in a different way. Understanding these differences is important for interpreting the Agile Portfolio Management (APM) findings in this thesis.

2.4.1 SAFe (Scaled Agile Framework)

SAFe (Scaled Agile Framework) is one of the most widely used Agile scaling frameworks, and it is now in its sixth version (Scaled Agile, Inc, 2023). SAFe 6.0 is not just about software delivery anymore but it also focuses on “Business Agility,” which is the ability of an entire organisation to quickly adapt to changes in customers and the market. At the portfolio level, SAFe uses something called Lean Portfolio Management (LPM). This includes three main areas: deciding strategy and where to invest money, managing work in an Agile way, and keeping governance uncomplicated but still controlled. Work is organised using a Portfolio Kanban, which tracks big initiatives (called Epics) as they move from idea to planning and then to delivery, so leaders can see what is happening across the portfolio. Instead of giving out yearly project budgets, SAFe uses Lean Budget Guardrails. This means funding is given to ongoing streams of work rather than fixed projects. This helps avoid what (Scaled Agile, Inc, 2023) calls the “project funding trap,” where money gets stuck in old plans even when priorities change. For deciding what to do first, SAFe uses a method called Weighted Shortest Job First (WSJF). It ranks work based on value, urgency, risk, and effort, helping organisations make more sensible prioritisation decisions.

SAFe is widely used in industry, but it gets both praise and criticism. People who support it say it is very detailed and gives clear guidance for every level of an organisation, from individual teams all

the way up to enterprise management. It includes defined roles, meetings, and tools, which can make it easier for large organisations to adopt Agile in a structured way. On the other hand, critics say this level of structure can slow things down. A study by Dikert, Paasivaara, and Lassenius (2016) found that companies undergoing large-scale Agile transformations often encounter excessive meetings and process bureaucracy, which can reduce team autonomy and add governance overhead (Dikert et al., 2016).

2.4.2 LeSS (Large-Scale Scrum)

LeSS (Large-Scale Scrum) uses a very simple approach to management and governance. It is based on the idea that many problems in large Agile organisations are caused by too much complexity, and the solution is to simplify the structure instead of adding more rules, roles, or layers of control (Larman & Vodde, 2016). At the portfolio level, LeSS uses just one Product Backlog for all teams. There is one Overall Product Owner who decides what gets priority across all teams. In bigger setups (called LeSS Huge, usually for eight or more teams), Area Product Owners help manage different parts of the product. LeSS avoids adding extra roles, meetings, or documents because it believes this only creates more complexity and slows things down. Compared to SAFe, which adds more structure and governance layers, LeSS focuses on keeping things as simple as possible. However, this simple approach does not always fit well in organisations that manage multiple products. In those cases, companies often need to deal with competing priorities, shared budgets, and accountability to different stakeholders, which can be harder to handle with a very minimal governance model.

2.4.3 Disciplined Agile (DA)

Project Management Institute's Disciplined Agile (DA), acquired by PMI in 2019, uses a flexible approach instead of making every organisation follow one strict system (Ambler & Lines, 2020a). It believes that different teams and companies need different ways of working depending on things like team size, company culture, rules and regulations, and the type of project being done. At the portfolio level, DA treats portfolio management as something that should happen continuously, not just once a year. It also helps combine traditional project management methods such as PMBOK with Agile ways of working (Project Management Institute, 2017). This is useful for large organisations where finance and management teams still use traditional systems, while project teams work in Agile ways. The main strength of DA is its flexibility, because organisations can adapt it to suit their own needs. However, this can also make things confusing, since there is no single clear definition of what "good" portfolio governance should look like.

The three frameworks differ mainly in where portfolio decisions sit. SAFe adds a dedicated portfolio layer with its own roles, cadences and funding model (Scaled Agile, Inc, 2023), LeSS keeps prioritisation with a single Overall Product Owner and avoids additional layers (Larman & Vodde, 2016), and DA leaves the design to each organisation (Ambler & Lines, 2020). SAFe and DA both move away from annual project-based funding or review, whereas LeSS addresses the same coordination problem by reducing structure. These descriptions follow the framework owners and authors (Scaled Agile, Inc, 2023; Larman & Vodde, 2016; Ambler & Lines, 2020), so they state intended practice and are not evidence of results.

A common problem with all three frameworks is that they are mostly based on recommended ideas rather than strong real-world evidence. Stettina and Hörz (2015) explain that there is still not much research showing how these frameworks actually work when organisations use them in practice (Stettina & Hörz, 2015). Laanti, Sirkiä, and Kangas (2015) found that the Finnish Broadcasting Company Yle improved its governance after using SAFe, but some teams felt the framework was too controlling and gave them less freedom (Laanti et al., 2015). This is a single-organisation case, so it shows what one adopter reported and does not show how SAFe performs elsewhere. Aghajani et al. (2023) report that the mechanisms through which portfolio management adapts to agile projects and achieves portfolio success have not been thoroughly investigated. There is therefore still a gap between what the frameworks suggest and what organisations do in practice (Stettina & Hörz, 2015).. This gap between theory and real practice is one of the main reasons for this thesis and for using the MLR method explained in Chapter 3.

See Appendix I for a detailed comparison of SAFe, LeSS, and Disciplined Agile across portfolio-level governance dimensions, including strengths, limitations, and empirical evidence.

2.5 Agile Portfolio Management in Practice: Empirical Evidence

Framework documents usually explain how Agile Portfolio Management (APM) is meant to work in theory. On the other hand, research studies show how it actually works in real organisations. This section combines key findings from the studies used in this thesis, along with other relevant research, to build a clear picture of what is really happening in practice. This helps provide context for understanding the results presented in Chapter 4.

Stettina and Hörz (2015) carried out one of the most detailed studies on how Agile Portfolio Management (APM) is actually used in organisations. They interviewed people from 14 large European companies and identified five main areas: portfolio strategy, governance, planning,

monitoring work, and learning (Stettina & Hörz, 2015). The weakest area was portfolio learning, which means taking time to reflect on decisions and improve how things are managed over time. Only about 32% of the organisations showed this clearly. This matches what Cooper (2011) pointed out earlier, that learning is an important part of good portfolio management. It also suggests that most organisations use APM mainly for planning and tracking work, but don't always focus on improving their governance over time (Cooper, 2011). This is perhaps understandable as portfolio learning is a meta-level governance activity that requires organisations to reflect on and improve their decision-making processes rather than simply enact them, making it susceptible to deprioritisation under sustained delivery pressure (Cooper, 2011).

Stettina & Hörz, 2015 found something important: the gap between what Agile frameworks say should happen and what actually happens in organisations is not mainly because people don't know the frameworks. Most organisations already had access to guides like SAFe. The real issue is how organisations are set up. To properly use Agile at the portfolio level, companies often need to change budgeting, reporting, and planning processes. These are big changes that sit with senior management, not Agile teams. So, portfolio governance is really a leadership responsibility (Stettina & Hörz, 2015). The gap exists partly because the people who can make these changes are often not the ones directly involved in Agile work day to day.

Alves and Gonçalves (2023) examined five Brazilian IT organisations using a grounded theory approach, finding that Agile PPM adoption was driven primarily by competitive market pressure rather than internal efficiency goals. Across all five cases, the most frequently cited benefits of APPM were quality of delivery (55%), value creation (22%), and improved stakeholder communication (18%). The percentages show how often benefits were cited across the five cases and do not measure their size. Their study also found that in the largest organisation which was a 30,000-employee firm applying SAFe and an effective Agile adoption required top-down commitment initiated at presidential level, a finding consistent with the broader leadership sponsorship evidence in the APM literature (Alves & Gonçalves, 2023).

The study by Alves and Gonçalves (2023) also found that formal portfolio management was absent in the smaller organisations examined, where informal co-ordination replaced structured PPM processes regardless of Agile adoption status. This reinforces the governance gap identified in Section 2.3. Agile adoption at team level does not automatically produce portfolio-level governance.

Laanti, Sirkiä, and Kangas (2015) looked at how the Finnish Broadcasting Company Yle changed from traditional project and portfolio management to Agile portfolio management. Their study is one of the few that follows this kind of change over time in a real organisation (Laanti et al., 2015). Senapathi and Strobe (2024), in a six-year longitudinal case study of sustained organisational agility (a working paper posted on SSRN), similarly found that an incompatible funding model was among the primary barriers organisations faced when attempting to maintain Agile governance over time, and that actively changing the funding model was one of the most impactful remedial actions available hence reinforcing the Laanti et al. finding about the centrality of moving from annual project-based budgeting to rolling portfolio reviews (Senapathi & Strobe, 2024). They found that one of the biggest improvements came from replacing yearly budgeting with quarterly portfolio reviews. This cut down management work by about 40% and helped improve how well projects matched the organisation's goals (Laanti et al., 2015). As noted in Section 2.4, this is one organisation's experience. But the main challenge was not technical that is it was people. Many programme managers resisted the change because they lost some of their decision-making power when the organisation moved from managing individual projects to managing value streams. This matches what Ajjan et al. (2013) found, where business stakeholder resistance was also a common barrier to adopting portfolio management (Ajjan et al., 2013). Ajjan et al. (2013) surveyed adopters and non-adopters of IT project portfolio management in general, not of Agile portfolio practice.

The obstacles reported in these studies are mainly organisational. They include changes to budgeting and funding models (Laanti et al., 2015; Senapathi & Strobe, 2024), the need for commitment from senior leadership (Alves & Gonçalves, 2023; Stettina & Hörz, 2015) and resistance from managers or stakeholders whose decision rights change (Ajjan et al., 2013; Laanti et al., 2015). Knowledge of the frameworks is not reported as the main constraint (Stettina & Hörz, 2015). The studies also share limits. Most are interview, grounded theory or longitudinal case studies in a small number of settings, so they show what can occur rather than how often it occurs. They also concentrate on organisations that were adopting Agile portfolio practices, and the absence of portfolio management appears mainly as a side finding, as in the smaller organisations examined by Alves and Gonçalves (2023).

Earlier reviews and models cover parts of this topic. Table 2-1 compares six of them with this thesis on scope, evidence base, method and main findings.

Table 2-1
Earlier reviews and models compared with this thesis

Study	Scope	Evidence base and method	Main findings
Puthenpurackal Chakko et al. (2021)	Effects of agile delivery on enterprise IT portfolio management, and approaches that support portfolio agility	Systematic review of 21 empirical studies from six academic databases (search in June 2020); grey literature and non-empirical papers excluded; thematic synthesis	Six portfolio areas affected, including strategic alignment and financial processes; no portfolio-level practice for learning reported; evidence in many studies of low strength
Batista et al. (2022)	Practices suited to the resource, priority and governance challenges of agile portfolio management, and the contexts in which they fit	Systematic review of 28 articles published 2005 to 2020	Literature on agile portfolio management judged very limited; review offered as a baseline for empirical studies
Edison et al. (2022)	Large-scale agile methods (SAFe, LeSS, Scrum-at-Scale, DAD, Spotify model, custom-built methods) compared by principles, practices, tools and metrics	Systematic review of 191 primary studies from 134 organizations; quality assessment applied; grey literature excluded	Emphasis on practices more than principles; 31 challenges and 27 success factors identified
Horlach et al. (2019)	Design goals and principles for agile IT portfolio management	Design science in two cycles: interviews and a focus group in six organizations, and a literature review; evaluation with experts from ten organizations	Four design goals and six design principles; authors note six organizations and an immature field as limits
Aghajani et al. (2023)	Success criteria and success factors in agile IT and software portfolios of large organizations	Multiple case study of seven large organizations	Four success criteria and 15 success factors, combined in an agile portfolio success framework
Dias and Tenera (2023)	Agile portfolio management model for the insurance sector (APMI)	Design science with a case study; model designed and tested in insurance	High satisfaction with implementation reported; model said to support strategic alignment, visibility and capacity coordination
This thesis	Governance of APM in large-scale software development: need, consequences of absence, barriers and governance structures (RQ1 to RQ4)	Multivocal literature review of 41 sources (23 academic, 18 grey) and 923 coded extracts; PRISMA-adapted screening; reflexive thematic analysis	16 merged themes and a conceptual framework for APM governance (Section 5.4)

Note. Entries follow each study's own account of its scope, evidence and method.

Two of the three systematic reviews excluded grey literature (Edison et al., 2022; Puthenpurackal Chakko et al., 2021); this thesis codes 18 grey literature sources alongside 23 academic sources. The reviews and models also concentrate on portfolio practices, large-scale methods or success factors, whereas this thesis asks why governance is needed, what follows from its absence, what prevents adoption and which structures sustain it. The evidence bases differ in part: by title, three of the 21 studies in Puthenpurackal Chakko et al. (2021) are also in this thesis (Dingsøyr et al., 2018; Hoffmann et al., 2020; Stettina & Hörz, 2015), and the study lists of the other reviews were not compared. Puthenpurackal Chakko et al. (2021) and Batista et al. (2022) both describe the literature on agile portfolio management as limited, in line with the small evidence base noted in Sections 2.3 and 2.5. Within the studies compared here, none is reported as a multivocal review of academic and practitioner documents on APM governance.

2.6 Synthesising the Integrated Theoretical Framework

Taken together, Sections 2.2 to 2.5 point to three gaps. First, the PPM literature assumes projects with defined scope and end dates and gives limited guidance on governing continuous Agile product funding (Section 2.2). Second, the scaling frameworks describe portfolio governance in detail, but these descriptions are prescriptive, come mainly from framework authors and have few independent empirical evaluations (Sections 2.3 and 2.4). Third, the empirical studies are few and context-specific, and they locate the main obstacles in funding, leadership and resistance rather than in knowledge of the frameworks (Section 2.5). Within the literature reviewed in this chapter, the need for APM, the consequences of its absence, the barriers to adoption and the governance arrangements that support it are mostly examined in separate studies and in either academic or practitioner sources. Table 2-1 compares earlier reviews and models with this thesis. RQ1 and RQ4 respond mainly to the first two gaps, and RQ2 and RQ3 to the third. Project Portfolio Management and large-scale Agile governance address the same problem from different directions, and the framework below brings them together for that purpose.

An important point about this integrated framework is what it doesn't claim. It does not say that any specific mix of PPM processes and Agile governance will automatically lead to better results. It also does not assume that what works in one organisation will work the same way in another. And it doesn't treat the scaling frameworks discussed in Section 2.4 as proven solutions. Instead, it looks at all of these as things to study in real situations. PPM practices are seen as tools organisations can use when needed. Agile governance methods are ways of coordinating work, but their success

depends on the situation. Scaling frameworks are treated as common industry approaches, but in practice, people often use them differently from how they are described in theory. This approach is intentionally neutral. It fits with the interpretive nature of the multivocal literature review and focuses on what actually happens in practice, rather than what is supposed to happen in theory.

Figure 2-3 presents the integrated conceptual framework as a three-layer structure. This chapter draws entirely on existing PPM and large-scale Agile literature to construct this background framework. The synthesis with MLR findings and any further conceptual development arising from the analysis are reserved for Chapters 4 and 5. The framework here positions and motivates the study rather than reporting findings. Layer 1 identifies the two theoretical bodies that constitute the foundations of this thesis: Project Portfolio Management and large-scale Agile governance. Layer 2 represents the integrated analytical framework formed by synthesising these two traditions. Layer 3 shows the four research questions that the framework is applied to analyse. The downward arrows indicate the direction of theoretical contribution: each foundational body informs the integrated framework, and the framework in turn provides the analytical vocabulary for each research question. This three-layer structure follows established practice in IS research for presenting conceptual frameworks that draw on multiple theoretical traditions (Webster & Watson, 2002).

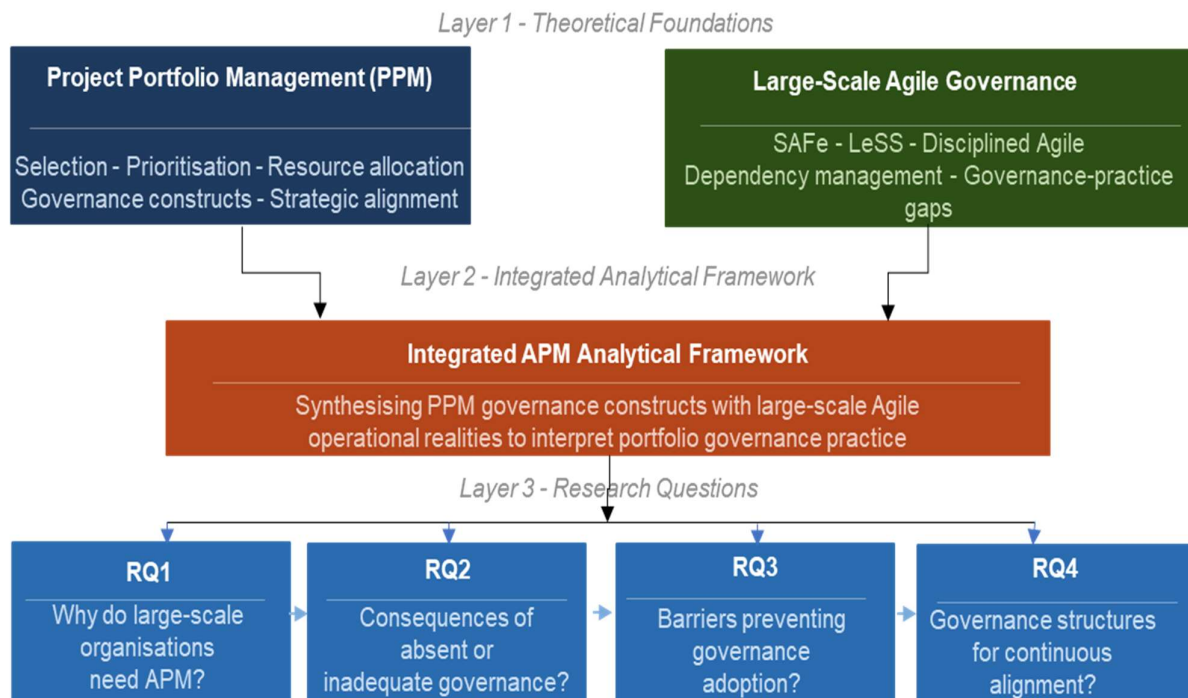
The left-hand pillar, Project Portfolio Management, contributes the structural and process-level vocabulary for understanding governance. From this body of literature, the framework draws the concepts of strategic alignment, resource allocation, selection and prioritisation criteria, and the formal governance roles and processes through which portfolio decisions are made and held accountable (Cooper et al., 1999, 2001; Project Management Institute, 2017). These constructs ground RQ1, which asks why organisations need portfolio governance, and RQ4, which asks what governance structures support continuous alignment with evolving business objectives. Without the PPM vocabulary, the thesis would lack a governance referent which is a way of specifying what effective governance means beyond the operational language of individual scaling frameworks.

The right-hand pillar, large-scale Agile governance, contributes the operational context within which portfolio governance is enacted in software development organisations. From this body, the framework draws evidence of coordination failures across multiple Agile teams, the documented gap between scaling framework prescription and enacted governance practice, and the organisational, cultural, and structural factors that impede effective governance development (Dikert et al., 2016; Dingsøyr et al., 2018; Laanti et al., 2015; Paasivaara et al., 2018). These contributions ground RQ2, which addresses the consequences of absent or inadequate governance, and RQ3, which

addresses the barriers that prevent governance adoption. Without this body, the framework would remain at the level of abstract governance principles that may not map onto actual organisational practice in large-scale software development.

The horizontal arrow at the base of the diagram makes the sequential analytical logic explicit. The four research questions are not independent: each one builds on the evidential foundation established by the preceding question. RQ1 establishes that portfolio governance is needed; RQ2 establishes what happens when it is absent; RQ3 identifies what prevents organisations from developing it; and RQ4 identifies what governance structures succeed in sustaining it. This sequence structures the presentation of MLR findings in Chapter 4 and the synthesis and discussion in Chapter 5.

Figure 2-3
Layered Conceptual Framework.



Note. Adapted from (Cooper et al., 1999; Dingsøyr et al., 2018; Paasivaara et al., 2018; Project Management Institute, 2017). Arrows indicate the direction of theoretical contribution from each foundational body to the integrated framework, and from the framework to each of the four research questions. The sequential arrow across RQ1–RQ4 indicates the analytical logic of the Multivocal Literature Review: need → consequences → barriers → solutions.

This framework is not trying to say what Agile Portfolio Management (APM) governance should look like or how it should be done. It's not giving rules or recommendations. Instead, it is meant to help

analyse and understand things. It provides a set of simple concepts to organise and make sense of evidence from both research papers and real-world industry practice. This includes how APM governance actually works, where it fails, and why those problems happen. It combines ideas from traditional portfolio management (PPM) with what actually happens in large-scale Agile environments. This helps make sense of the findings across all four research questions.

2.7 Chapter Summary

This chapter has explained the main ideas and theory that support this thesis. Project Portfolio Management (PPM) gives the background for understanding portfolio governance. It started with (H. Markowitz, 1952) financial portfolio theory, was later applied to IT investment decisions by (McFarlan, 1981), developed into a formal management approach by Cooper, Edgett, and Kleinschmidt (1999, 2001) (Cooper et al., 1999, 2001), and later became a recognised standard through the PMI (2017) (Project Management Institute, 2017). The challenges of scaling Agile also show why portfolio-level governance is needed. Problems like managing dependencies between teams, dealing with limited resources, and keeping work aligned with business goals show that team-level Agile is not enough for large organisations. Because of this, governance at the portfolio level becomes necessary, not optional.

The main scaling frameworks such as SAFe, LeSS, and Disciplined Agile are ways practitioners try to solve the problem of scaling Agile. Each one has a different focus: SAFe uses more structured control, LeSS tries to simplify governance, and Disciplined Agile adjusts based on the situation. But real-world evidence shows that success depends less on which framework is used and more on the organisation itself. Things like strong leadership support, clear visibility of work across the portfolio, a supportive culture, and good-quality data matter more than the framework choice. The APM governance maturity model **Figure 2-2** explains this by showing how organisations usually develop over time, moving from informal, ad-hoc governance to more mature and well-structured approaches.

The integrated theoretical framework **Figure 2-3** brings the two areas of literature together and forms the basis for the findings from the multivocal literature review (MLR) in Chapter 4. The four research questions are based on this framework which was derived by synthesising the two bodies of literature reviewed in Sections 2.2 and 2.3 using the concept-centric approach recommended by Webster and Watson (2002) (Webster & Watson, 2002). This framework is not a finding of the MLR; it provides the analytical lens through which the MLR evidence is organised and interpreted. Chapter 3 explains the MLR design and execution, and Chapters 4 and 5 report and discuss the findings. RQ1 and RQ2

look at why portfolio governance is needed and what happens when it is missing. RQ3 looks at the barriers that make it hard for organisations to adopt good portfolio governance. RQ4 looks at how Agile Portfolio Management actually works at the portfolio level.

Chapter 3 justifies the interpretive stance and the Multivocal Literature Review design, and documents how the MLR protocol was executed, from the dual-stream search and quality assessment to data extraction and Reflexive Thematic Analysis.

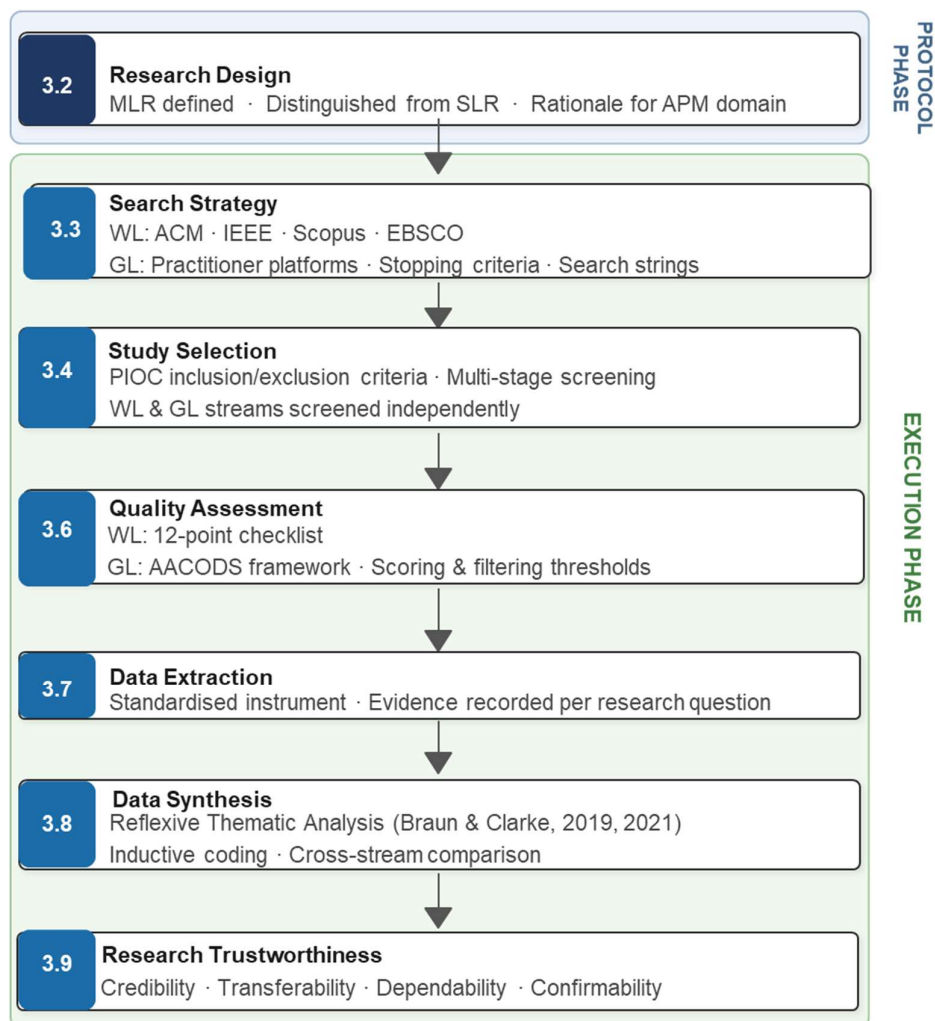
Chapter 3 Research Methodology

3.1 Introduction

This chapter presents and justifies the research methodology adopted in this study: a Multivocal Literature Review (MLR). **Figure 3-1** provides an overview of the full MLR process, illustrating the sequential stages through which both White Literature (peer-reviewed academic sources) and Grey Literature (practitioner, non-peer-reviewed sources) are identified, screened, quality-assessed, extracted, and synthesised into thematic findings. Sections 3.2 to 3.7 set out the research design, the search strategy, study selection, quality assessment, data extraction and data synthesis, and Section 3.8 summarises the chapter and handover to chapter 4.

Figure 3-1

Methodology framework illustrating the sequential stages of the multivocal literature review process.



3.2 Research Design: The Multivocal Literature Review

Before execution, a formal MLR protocol was drafted that specified the complete execution framework for this review: the search strategy, database selection and search string construction, PIOC (Population, Intervention, Outcome, Context) inclusion and exclusion criteria, quality assessment thresholds for both White Literature (WL) and Grey Literature (GL), and the data extraction instrument. The protocol was validated through a two-stage process before full execution commenced. In the first stage, the complete protocol document was submitted to both academic supervisors (Assoc. Prof. Tony Clear and Dr. Ramesh Lal) for formal review. process. Maps the full MLR process across both phases of the review. Section 3.2 represents the protocol design phase,

in which the scope, methodology, and execution framework were defined before any searching commenced. Sections 3.3 through 3.7 represent the execution phase, in which the search strategy was applied, sources were selected and quality-assessed, data were extracted and synthesised, and the trustworthiness of the review was evaluated. The diagram provides an integrated view of how these activities connect across the full lifecycle of the review.

In line with the SLR guidelines outlined by Kitchenham & Charters (2007), the protocol was validated and approved to ensure that the following criteria are met:

- The search strings are directly derived from the research questions.
- The study selection criteria and processes for WL and GL are appropriate.
- The data synthesis procedure is suitable for addressing the research questions.

In the second stage, a preliminary pilot study conceptually equivalent to a “mini MLR” (Felizardo et al., 2017) was conducted on a small, representative sample of sources drawn from a single database. The pilot tested the operational efficiency of the search strings, the clarity and consistency of the PIOC criteria, and the practical workability of the data extraction instrument on actual sources. The pilot identified the need for minor clarifications for borderline cases, particularly in distinguishing between project-level and portfolio-level governance content. These clarifications were incorporated before full execution began. This two-stage validation approach is consistent with the procedure recommended by Garousi et al. (2019) for MLRs in software engineering, and mirrors the practice adopted by Antil (2023) and Zhao(2024) at AUT (Antil, 2023; Zhao et al., 2024), where protocol review by the same supervisory team preceded full MLR execution. The finalised protocol document is provided in Appendix.

3.2.1 What Is a Multivocal Literature Review?

A Multivocal Literature Review (MLR) is a systematic methodology for synthesising both peer-reviewed academic literature (White Literature, WL) and non-peer-reviewed practitioner literature (Grey Literature, GL), including industry reports, white papers, framework documentation, professional blogs, and conference presentations (Garousi et al., 2019). It's worth clarifying that the term multivocal reflects the methodology's deliberate incorporation of multiple voices, namely academic researchers and industry practitioners, rather than privileging only one set. MLRs build on the systematic rigour of the SLR while extending its scope to include grey literature, following structured criteria for its identification, selection, and quality assessment.

The methodological framework for MLRs in software engineering was formalised by (Felizardo et al., 2017; Garousi et al., 2019) whose guidelines cover the rationale for grey literature inclusion, search strategies for both literature streams, quality assessment criteria for non-peer-reviewed sources, and reporting standards (Garousi et al., 2019). These guidelines are the methodological foundation on which this MLR is designed, and the protocol developed for this research (reviewed and validated by supervisors prior to execution) adheres to them throughout.

3.2.2 Rationale for MLR Over SLR

The decision to use an MLR rather than a traditional SLR reflects the specific characteristics of the APM knowledge domain. Academic literature on APM is demonstrably insufficient as a standalone evidence base: while Project Portfolio Management as a broader discipline is well established, the specific challenge of integrating Agile delivery with portfolio-level governance is poorly theorised and empirically under-examined, with most contributions consisting of single-case studies or descriptive experience reports (Aghajani et al., 2023; Stettina & Hörz, 2015). APM is also a practice-driven field where innovations originate outside the conventional academic publishing cycle: the Scaled Agile Framework has undergone six major version iterations since 2011, and concepts such as Lean Portfolio Management, WSJF prioritisation, and value-stream funding were adopted at scale before academic researchers began studying them systematically (Knaster & Leffingwell, 2020; Müller et al., 2025). An SLR would therefore exclude the primary documentation through which current APM governance is described, theorised, and refined.

Grey literature on APM provides contextual richness that academic literature cannot replicate as practitioners' reports document the specific roles, tooling configurations, measurement practices, and governance structures that organisations have implemented and the operational detail the four research questions require. Synthesising across both streams enables cross-stream comparison, where examining where academic evidence and practitioner knowledge converge or diverge is itself analytically productive, particularly where practitioners have developed responses the academic literature has not yet described. This approach is well-precedented: Antil (2023) and Zhao et al. (2024) both employed MLRs in domains where practitioner knowledge substantially precedes academic scrutiny.

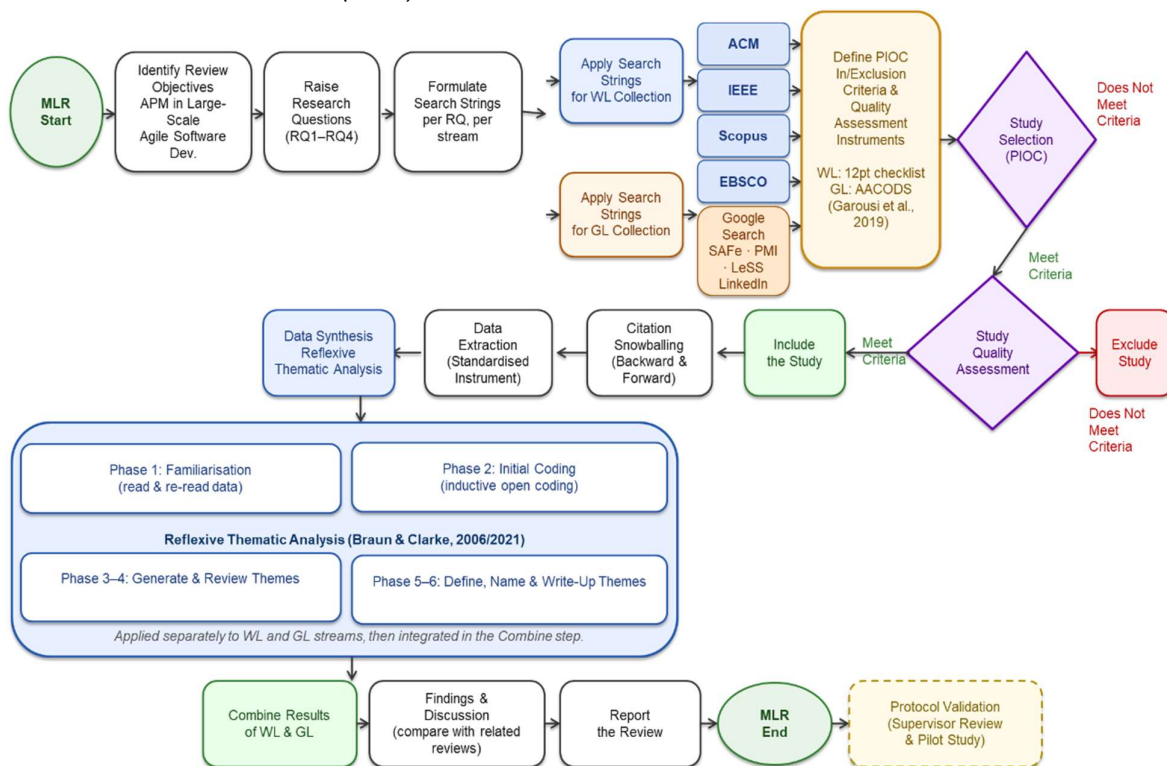
Figure 3-2 presents the end-to-end MLR process as designed and executed in this study, adapted from the procedural framework established by Garousi, Felderer and Mantyla (2019) (Garousi et al., 2019). The diagram maps every stage of the review from the initial identification of review objectives and research questions through to the final synthesis and reporting of findings and is intended to

give a transparent, auditable account of how each methodological decision connects to the next. As illustrated in **Figure 3-2**, these four phases do not operate as a strict linear sequence; rather, the outer protocol layer (Search Strategy, Eligibility Criteria, Quality Assessment) feeds forward into the inner execution layer (Identification, Screening, Eligibility, Inclusion), with each gate-keeping decision at one node shaping what proceeds to the next. The PIOC framework anchors the entire structure by defining the conceptual perimeter within which both WL and GL sources are evaluated.

The process begins at the top-left with the definition of review scope and the four research questions, then branches into two parallel literature collection streams that are White Literature and Grey Literature before converging at the quality assessment stage and progressing through data extraction and thematic synthesis to the final report. Reading the diagram left to right across the top row shows the planning and collection phases; the right column shows the selection and filtering logic applied to both streams; and the left column shows how included data moves through extraction and reflexive synthesis.

The top row of the diagram, MLR Start through to Formulate Search Strings, represents the planning phase which involve defining the review scope, raising the four research questions, and constructing the search strings that drive both literature streams. The diagram then splits with the upper branch applies search strings across the four White Literature databases (ACM, IEEE, Scopus, and EBSCO), while the lower branch applies them through Google Search with domain-specific filters to access practitioner sources from SAFe, PMI Disciplined Agile, LeSS, and LinkedIn. Both branches feed into the criteria-definition box on the right, where PIOC inclusion and exclusion criteria are specified alongside the quality assessment instruments: the 12-point checklist for White Literature and the AACO (Authority, Accuracy, Coverage, Objectivity, Date, Significance) framework for Grey Literature. The Study Selection diamond applies PIOC criteria first; sources meeting these criteria proceed to the Study Quality Assessment diamond, where each source is scored against the appropriate instrument. Sources failing either gate are directed to the Exclude box with the reason recorded for transparency. Included sources then proceed through citation snowballing by applying backward and forward snowballing to all high-quality included papers followed by standardised data extraction. The left-hand section shows the six-phase Reflexive Thematic Analysis process (Braun & Clarke, 2019, 2021b) including familiarisation, initial coding, theme generation, theme review, theme definition, and write-up. The bottom row shows how synthesised findings from both streams are combined, compared against related reviews for triangulation, and formally reported. The process concludes with protocol validation, which in this study comprised supervisor review of the full protocol document and a pilot study conducted before full execution.

Figure 3-2
Multivocal Literature Review (MLR)



Note: Adapted from Garousi, Felderer & Mantyla, 2019 (Garousi et al., 2019).

3.3 Search Strategy

This study employs a Multivocal Literature Review (MLR) methodology to ensure comprehensive knowledge synthesis and a strategy critically necessary due to the recognized rigor-relevance gap in APM research (Müller et al., 2025). Academic research often lacks extensive empirical evaluation of APM frameworks "in use" across multiple cases, while practitioner literature provides rich contextual data on enacted practices and challenges (Stettina & Hörz, 2015).

The MLR strategy aims to maximize comprehensive coverage of both the theoretical foundations (scholarly literature) and the current state of practice (grey literature) to achieve the research objective of developing empirically grounded governance recommendations that reconcile alignment, efficiency, and agility (Hoffmann et al., 2020).

The search strategy was designed to achieve thorough coverage of both White Literature (WL) and Grey Literature (GL) relevant to the four research questions. It was developed iteratively, with search strings piloted on a representative sample of sources before finalization.

3.3.1 White Literature Databases

White Literature sources were retrieved from four academic databases: Scopus, IEEE Xplore, ACM Digital Library, and EBSCO. These were chosen for their disciplinary reach across software engineering, information systems, strategic management, and organisational behaviour. A systematic keyword search across all four produced the theoretical and empirical grounding for Agile Portfolio Management, large-scale Agile software development, and organisational agility. Their bibliometric coverage and indexing standards also make them well-suited to a PRISMA-compliant search, which matters for keeping selection bias in check (Kitchenham & Charters, 2007). The following academic databases were used to establish a sound academic foundation.

- **The ACM Digital Library** was selected for its thorough coverage of software engineering, Agile development, and technical governance literature, and is essential for capturing core contributions from the computing and information technology research communities.
- **IEEE Xplore** was included for its coverage of software engineering and IT systems research, in particular conference proceedings from key venues such as the International Conference on Software Engineering (ICSE) and the Agile Conference.
- **Scopus** was included as a broad multidisciplinary database covering peer-reviewed journals in information systems, management, and organisational behaviour, enabling the capture of APM-adjacent research from management science and strategy literature that would not appear in computing-specific databases.
- **EBSCO (Business Source Complete)** covers strategic management, organisational structure, Agile management theory literature, which is essential for RQ1 and RQ3.
- **Supplementary Search Technique (Snowballing):** Beyond database searches, backward and forward citation snowballing was applied to high-impact articles identified in the initial search (Wohlin, 2014). Backward snowballing examined the reference lists of selected papers to identify additional relevant sources; forward snowballing identified papers that cited selected sources using Google Scholar and Scopus citation tracking. This technique is particularly valuable in a field with a small number of foundational studies that have generated substantial subsequent research as is the case with (Stettina & Hörz, 2015) and (Garousi et al., 2019).

Snowballing was applied as a supplementary search technique to capture literature not indexed in the searched databases. Following Wohlin (2014), both backward and forward snowballing were conducted at one level of depth. Backward snowballing was performed first, examining the reference

lists of all high-quality included papers to surface foundational works; the resulting candidate set was then screened against the PIOC inclusion criteria. Forward snowballing was subsequently applied to identify papers that had cited those same foundational works in later literature. The backward-first sequence was adopted on the basis that it surfaces the intellectual antecedents of a field quickly and anchors the forward search in sources already demonstrated to be relevant as a pattern Zhao et al. (2024) observed to yield stronger results in practice-dominated domains where foundational academic papers are sparse but widely cited, and which held here.

3.3.2 Grey Literature Sources

Grey literature was gathered through structured searches of targeted practitioner repositories and platforms, prioritising sources known to publish formalised APM frameworks, empirical implementation reports, and governance guidance from recognised professional bodies and consultancies.

Framework documentation and provider resources were a primary GL category. This included the Scaled Agile Framework (SAFe), which publishes extensive documentation on Portfolio Kanban, Lean Budgeting, and Agile Release Train governance (Accelerating Business Value with SAFe® and Technology Business Management, 2020; “Lean Portfolio Management Discipline,” n.d.; Knaster & Leffingwell, 2020); Large-Scale Scrum (LeSS) and Scrum@Scale, which offer alternative scaling approaches with portfolio-level implications (Larman & Vodde, 2016) and Disciplined Agile (DA), which provides a governance toolkit for varying organisational contexts (*The Disciplined Agile® (DA™) Tool Kit*, n.d.). Professional and consulting bodies formed a second major category: PMI, Thoughtworks, Centric Consulting, Atlassian all publish empirically grounded reports on large-scale Agile adoption and governance (*Accelerating Strategy Execution: Effective Portfolio, Program and Project Management*, n.d.; *Value-Driven Digital Business*, n.d.). Industry conference proceedings and practitioner blogs formed a third category, including content from the Global Scrum Gathering and Agile Alliance.

3.3.3 Stopping Criteria for Grey Literature (GL) Search

The GL search was capped at the first 50 results per string and domain. Search-ranking algorithms order results by site credibility, domain authority, and user intent, so the most influential practitioner sources reliably appear in early tiers (Garousi et al., 2019) making this a defensible stopping point. Software engineering MLR studies confirm a 50-result cap is sufficient for saturation in practice-dominated domains (Garousi et al., 2019).

Theoretical saturation has indicated that the stopping criterion was appropriate. The concept of theoretical saturation was originated with Lincoln & Guba, 1985 and is applied to thematic synthesis by Braun and Clarke (2006). Garousi et al. (2019) adopt it as a valid GL stopping criterion specifically for MLRs in software engineering. By the later search iterations, new strings were returning sources already included or clearly outside PIOC criteria. That pattern of diminishing returns across strings has confirmed that the stopping criterion was appropriate. A 50-result cap per string kept each search reproducible and easy to audit. All GL searches were run within a single two-week period, since spreading them out would introduce noise from shifts in how pages are indexed and ranked.

3.3.4 Search Strings

The following four research questions are the main focus of this study and directly determine the search string construction:

- RQ1: What is the need to adopt portfolio management in large-scale Agile software development?
- RQ2: What are the challenges that organisations face in the absence of portfolio management?
- RQ3: What are the barriers that stop organisations from implementing PPM?
- RQ4: What specific governance structures, roles, and decision-making processes within Agile Portfolio Management support continuous alignment with evolving business objectives?

Search strings were constructed by mapping terminology directly to each research question, following Kitchenham and Charters (2007). Boolean operators (AND, OR) combined four concept clusters: portfolio management terms, scale terms, RQ-specific outcome terms, and domain terms. Search strings vary across databases because each platform uses different field indexing structures and document-type filter syntax: Scopus requires TITLE-ABS-KEY operators, IEEE Xplore uses “All Metadata” and “Full Text & Metadata” fields, ACM uses Abstract field queries, and EBSCO requires TX (full-text) operators. The strings were adapted to each database’s syntax while preserving identical conceptual scope, as recommended by Kitchenham and Charters (2007). The complete search strings for all databases and research questions are documented in Appendix B.

For grey literature, consolidated search strings combining the core concept clusters were applied across Google with domain-specific filters (e.g., site:scaledagile.com, site:pmi.org) and across LinkedIn, Medium, SlideShare, and targeted industry repositories including Gartner and Thoughtworks. The search string for GL search is as below:

"Agile Portfolio Management" | "Portfolio Management"| "Project Portfolio Management" AND Agile | "Large Organization *" AND motivation | adoption | need | rational | necessity | benefit | driver | value | Challenges | Barriers | Absence | Inefficiency AND software | "Information Technology"

Domain-specific filters were applied as described in the search strategy above.

- Site:pmi.org
- Site: scaledagileframework.com
- Site:atlassian.com
- Site:thoughtworks.com
- Site: linkedIn.com

3.4 Study Selection

To maintain the quality and focus of this study, both inclusion and exclusion criteria have been clearly defined. These criteria have guided the selection of relevant studies from academic and industry sources, ensuring that the review remains aligned with the research questions on Agile Portfolio Management in large-scale Agile software development.

Study selection criteria were structured using the PICOC framework (Population, Comparison, Intervention, Outcome, Context), which provides a principled basis for defining inclusion and exclusion boundaries appropriate to the exploratory and prescriptive character of the research questions. PICOC is well-suited to research that spans multiple disciplines and organisational contexts because it enables criteria to be specified at multiple levels of abstraction simultaneously (Kitchenham & Charters, 2007). The Comparison element was not used because the research focus is not on comparing traditional and current approaches to portfolio management.

3.4.1 Inclusion Criteria

This study ensured that a focused and methodologically correct review is conducted; hence, the inclusion criteria are derived by using the **PIOC framework**, which supports the selection of studies that are aligned with the core objectives of this research. The PIOC (Population, Intervention, Outcome, Context) framework is a highly suitable methodological tool for structuring the complex exploratory and prescriptive inquiries that characterize research questions of this study. It ensures that the boundaries of this study are clearly defined, particularly given the inherent tensions between traditional Project Portfolio Management (PPM) and Large-Scale Agile Software Development

(LSASD) that this study is aiming to evaluate and analyze. Tab C1 in Appendix C will summarize the inclusion criteria that was used for source selection.

Additionally, all included sources must meet the following general criteria:

- **Language:** Published in English.
- **Publication Type:**
 - **White Literature:** Peer-reviewed journal articles and individual conference papers from Scopus, EBSCO, IEEE Xplore, and ACM. Records for whole conference proceedings were not eligible.
 - **Grey Literature:** Must fall into 1st Tier . The GL credibility tiers used here are derived from the (Adams et al., 2017) “shades of grey” model and operationalised for software engineering MLRs by Garousi et al. (2019). First-tier sources are official publications from recognised professional bodies and framework developers (e.g., PMI white papers, SAFe documentation, government reports) characterised by high outlet control and demonstrable author expertise. Second-tier sources are practitioner reports from established consultancies with named authorship and supporting evidence (e.g., McKinsey, Deloitte industry reports). The full five-category GL-A to GL-E classification is detailed in Section 3.5.3 . (e.g., PMI white papers, SAF and scale agile whitepapers, government reports) or 2nd Tier (e.g., industry reports from McKinsey/Deloitte, curated practitioner videos/presentations)
- **Date Range:** Published between **2000 and 2025** to capture traditional and modern Agile practices. This range is selected to capture the evolution of agile from its manifesto origins to contemporary "Red Queen effect" dynamics in hyper-competitive markets
- **Availability:** Full text must be accessible for thorough analysis. For Grey Literature, a structured stopping rule of the first 50 results per search string will be applied, subject to the observation of theoretical saturation

3.4.2 Exclusion Criteria

Sources were excluded when they did not satisfy one or more PIOC components as applied to this research. Studies focusing on non-software contexts, Waterfall-only projects, or small-scale Agile teams without portfolio-level coordination were excluded on Population grounds, since the governance challenges this thesis investigates are specific to large-scale, multi-team, complex delivery environments. Studies addressing only project- or team-level practices without extending to portfolio governance were excluded on Intervention grounds, even if they addressed Agile scaling

more broadly. Studies examining only individual performance or team productivity metrics, without reference to portfolio-level strategic alignment or governance outcomes, were excluded on Outcome grounds.

The population criterion in Appendix C describes large-scale settings as enterprises with multiple Agile teams, scaled frameworks or similar environments, and gives 250 employees as a typical figure and not as a fixed threshold. It was applied to the setting a source described. Conceptual, model and review papers, and grey literature framework documents and practitioner articles, do not sample an organisation, so employee numbers could not be assessed for them. These sources were retained where they addressed portfolio-level governance across several concurrent Agile teams or projects. Four white literature sources (EBSCO-RQ1-1, EBSCO-RQ1-12, IEEE-48 and Scopus-42) describe settings that may not meet the criterion. They were retained because they met the quality threshold (Appendix F) and addressed portfolio-level governance, which does not depend only on organisation size (Section 2.3). Section 6.6 reports how much of the evidence base these four sources supply.

For grey literature, additional exclusion criteria applied. Third-tier GL sources (short LinkedIn posts, personal opinion pieces without supporting data, and anonymous blogs where author expertise could not be verified) were excluded on credibility grounds (Garousi et al., 2019). Promotional or marketing materials lacking objective empirical grounding were excluded on objectivity grounds. Where multiple GL sources described the same organisational transformation, the most recent and methodologically rigorous version was retained. Table C2 in appendix C will summarize the exclusion criteria that was used for source selection.

3.4.3 Selection Process

The selection process followed the PRISMA framework, which provides a transparent, auditable structure for documenting each stage of identification, screening, eligibility assessment, and inclusion (Liberati et al., 2009; Page et al., 2021). Although PRISMA was originally developed for medical research, it has been widely adopted in software engineering systematic reviews for exactly these properties (Kitchenham et al., 2009)

For White Literature, the process moved through four stages. In the identification stage, database searches were conducted using the constructed search strings and all results were exported to Zotero and de-duplicated. In the screening stage, titles and abstracts were reviewed against the PIOC inclusion criteria. In the eligibility stage, full-text versions of remaining candidates were

retrieved and assessed against the full set of criteria. In the inclusion stage, sources passing all eligibility checks were accepted and quality assessment was applied.

For Grey Literature, the process was adapted to reflect the different structure and accessibility of GL sources. Following the GL search using targeted platforms and domain filters, each result within the stopping rule boundary was manually reviewed for relevance to the research questions. The credibility and relevance check was conducted on all eligible GL sources, and those failing the AACODS quality threshold were excluded. Snowballing within GL, following reference trails in major framework documentation, identified additional practitioner sources that did not appear in the initial search.

3.4.4 Search results

The combined PRISMA-guided process resulted in a final included evidence base of 41 sources: 23 White Literature and 18 Grey Literature. These 41 sources generated 923 coded extracts across the four research questions, providing the evidence base for the thematic synthesis reported in Chapter 4.

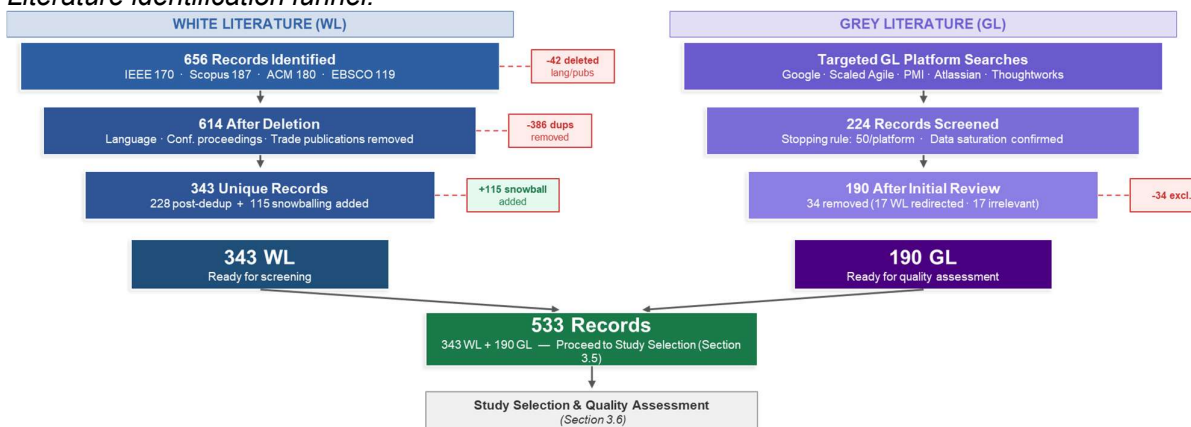
For White Literature, the selection funnel moved through four stages. Initial searches across ACM, IEEE, Scopus, and EBSCO identified 656 records (ACM: 180; IEEE: 170; Scopus: 187; EBSCO: 119). Fourteen ACM records for conference proceedings and 27 EBSCO trade publication records were removed as document types that do not satisfy the peer-review requirement for White Literature inclusion. Proceedings record compiles papers and do not itself report findings. Individual conference papers were eligible and were not removed on this ground, and 53 of the ACM records retained after deduplication were conference papers. After deduplication of records appearing across multiple databases, 343 records proceeded to full quality assessment against the 12-point checklist described in Section 3.5.2. Appendix D summarizes the results by database. No included source carries an ACM identifier. Two of them (IEEE-10 and Scopus-42) were also returned by the ACM search and appear under their IEEE and Scopus identifiers.

The Grey Literature stream follows a structurally parallel but methodologically distinct pathway. Rather than database exports, the GL search was conducted across five targeted practitioner platforms: Google (general web search with domain-specific filters), the Scaled Agile Framework website (scaledagileframework.com), PMI (pmi.org), Atlassian (atlassian.com), and Thoughtworks (thoughtworks.com). A structured stopping rule of 50 results per platform was applied, yielding a total of 224 records screened across all five platforms. An initial review then removed 34 records: 17

Google results identified as White Literature sources and redirected to the WL stream, and a further 17 pages excluded as irrelevant across SAFE (6), PMI (6), and Atlassian (5). This left 190 records for quality assessment using the AACODS framework, which assesses Authority, Accuracy, Coverage, Objectivity, Date, and Significance which is explained in section 3.5.2. A final GL-specific snowballing step followed reference trails within major framework documentation to surface additional practitioner sources not captured by the initial keyword search. Data saturation was observed at this stage: reference trails in the major framework documents consistently led back to sources already included in the evidence base, confirming closure of the GL search as per guidelines from Gaurosi (Garousi et al., 2019). Appendix D summaries the GL search results.

The search result numbers are represented by the literature identification funnel in **Figure 3-3**. This shows a dual-stream search along with the deletion and deduplication. White Literature (343 unique records) and Grey Literature (190 records after initial review) proceed to study selection and quality assessment. The diagram concept is adapted from the PRISMA 2020 flow diagram (Page et al., 2021).

Figure 3-3
Literature identification funnel.



3.5 Quality Assessment

To ensure the studies included in this review are trustworthy and relevant, a structured quality assessment process was applied. Quality assessment in an MLR serves multiple functions: it filters out sources whose limitations make their findings unreliable, it enables differentiated weighting of evidence in the synthesis stage, and it makes the reasoning transparent to examiners and future researchers. It also separates high-quality evidence from weaker or less transparent sources (Garousi et al., 2019; Kitchenham & Charters, 2007). The quality assessment covered six aspects:

-
- How trustworthy the source is (e.g., is it peer-reviewed or from a reputable organization?)
 - Whether the study is methodologically sound
 - How transparent and unbiased the findings seem
 - Whether the content is clearly related to the research questions
 - The quality and depth of evidence presented
 - Whether the study contributes meaningfully to either research or practice

3.5.1 The Need for a Dual-Tiered Quality Assessment

Due to the nature of the study, which combines academic (WL) and practitioner resources (GL), a single unified scoring system is not appropriate for an MLR because it would either penalise grey literature for lacking formal research methodology, which would exclude highly relevant practitioner knowledge, or lower the standards for academic literature by accepting sources with weak methodological foundations. This study therefore applies separate but complementary assessment frameworks to each literature stream (Hoffmann et al., 2020).

Therefore, the QA is separated into two distinct, yet complementary, stages:

- **Quality Assessment of Scholarly Literature:** Focuses on methodological soundness and internal/external validity.
- **Critical Appraisal of Grey Literature:** Focuses on the utility, transparency, and contextual richness of reported findings relevant to APM governance

3.5.2 White Literature Quality Assessment

Academic sources were assessed using a 12-point checklist adapted from established systematic review guidelines (Kitchenham et al., 2009). The checklist comprises of six categories, each containing two binary questions answered as Yes (1) or No (0), for a maximum score of 12 points. Appendix E presents the full checklist and scoring scheme.

Sources achieving a minimum of 5 out of 12 points were provisionally included. Sources scoring below this threshold could be retained if they were frequently cited in high-quality sources or reported seminal findings directly relevant to APM; in such cases, their methodological limitations were explicitly acknowledged in the synthesis. This flexible threshold approach reflects established practice in MLRs, where completeness of the evidence base is prioritised over strict exclusion of borderline sources, provided that analytical weight is calibrated accordingly (Garousi et al., 2019).

3.5.3 Grey Literature Quality Assessment: AACODS

Grey literature was assessed using the AACODS framework (Authority, Accuracy, Coverage, Objectivity, Date, Significance), adapted from (Garousi et al., 2019) and extended to align with the specific evidential requirements of this research. AACODS was selected because it was designed for evaluating non-peer-reviewed sources and has been validated in the software engineering MLR literature as a sound and auditable appraisal instrument. Appendix E details the scoring criteria for each dimension, including both the positive and negative scoring rationale.

The same AACODS instrument was used by Zhao et al. (2024) in a DevSecOps MLR and confirmed it reliably separates high-value practitioner contributions from low-quality promotional content. This matters here because DevSecOps and APM share the same research profile: both are practice-driven fields where grey literature from vendors, professional bodies, and consultancies far outpaces peer-reviewed research (Aghajani et al., 2023; Garousi et al., 2019). AACODS was designed for exactly this kind of evidence base.

To apply the Authority criterion consistently, each GL source was assigned to a credibility tier before scoring. The scheme extends Adams et al.'s (2017) two-dimensional model which rates grey literature on outlet control and producer expertise and Garousi et al.'s (2019) three-tier system, refining both to allow finer discrimination relevant to APM sources.

GL-A: Institutional or professional body publications with no commercial bias: PMI standards, government reports, independent research outputs. Paez (2017) identifies this as the highest-value grey literature category precisely because these bodies have no stake in a particular commercial outcome(Paez, 2017).

GL-B: Vendor documentation with named authorship and a stated methodology, where the publishing organisation imposes editorial standards even if commercial interest is present. The Scaled Agile Framework website and Atlassian engineering guides are examples. Adams et al. (2017) place this in the high outlet control / moderate expertise quadrant.

GL-C: Practitioner guides, conference presentations, and consultant reports from identified authors with verifiable APM expertise. Garousi et al. (2019) classify these as Tier 2 sources.

GL-D: Promotional materials with no independent methodology or supporting evidence. Mahood et al., 2014 flag sources at this level as requiring explicit quality scrutiny to control for structural bias. In practice, GL-D sources fail the AACODS Objectivity criterion and were excluded.

GL-E: Anonymous blogs, social media posts, and short opinion pieces where authorship cannot be verified. Garousi et al. (2019) classify these as Tier 3. All GL-E sources were excluded at the source-type filtering stage (Section 3.5.3).

3.5.4 Scoring and Reviewer Process

All sources were independently assessed by the primary researcher using the respective quality assessment instruments. Quality scores were recorded in the data extraction spreadsheet to maintain transparency and auditability. Ambiguous or borderline cases (sources within one point of the threshold, or where relevance to a specific RQ was unclear) were discussed with the academic supervisors to reach consensus. This combination of independent primary assessment with supervisory review of borderline cases reflects the dual-reviewer quality check recommended by (Kitchenham & Charters, 2007) and is consistent with the approach adopted by (Antil, 2023) in analogous circumstances at AUT.

3.5.5 Filtering and Sorting Criteria for Final Source Selection

Systematic filtering and sorting of the identified literature are essential to maintaining the methodological rigour and transparency required of a high-fidelity Multivocal Literature Review (Garousi et al., 2019; Kitchenham et al., 2009). Quality scores alone do not determine final inclusion: a source may achieve a strong quality score yet provide limited substantive coverage of the four research questions, or may duplicate evidence already captured more comprehensively elsewhere. The criteria below formalise how quality assessment scores, document type, relevance to the research questions, and bibliometric indicators were combined to reach the final included evidence base of 41 sources. Applying these criteria explicitly creates an auditable trail that allows examiners and future researchers to understand precisely why certain sources were included and others excluded (Garousi et al., 2019)

Filtering Criteria for White Literature

The initial screening phase applied two binary filters to the candidate White Literature pool before quality scoring determined the final inclusion decision.

- **Document Type:** Inclusion was restricted to peer-reviewed journal articles and conference papers. This restriction ensures that the WL evidence base has undergone baseline scholarly scrutiny, supporting the rigour-relevance balance required when combining academic and practitioner evidence streams (Batista et al., 2022; Kitchenham & Charters, 2007). Book chapters and edited volumes were considered only where they represented seminal
-

contributions to APM or portfolio governance that are widely cited in the peer-reviewed literature.

- **PRISMA Suitability:** Following PRISMA screening guidelines (Liberati et al., 2009), each candidate source was evaluated for its empirical and conceptual alignment with the study scope. A positive suitability determination required the source to address at least one of the four research questions substantively that is, to report findings, models, or frameworks that directly inform APM governance in large-scale software development. Sources classified as unsuitable were excluded with recorded justifications, typically because they were primarily technical in orientation (addressing implementation tooling rather than governance) or lacked a portfolio-level unit of analysis (Batista et al., 2022).

Sorting Criteria for White Literature

Following initial filtering, the remaining WL sources were sorted to support differentiated weighting in the thematic synthesis. Two criteria informed this sorting.

- **Citation Count as a Bibliometric Proxy:** Citation count was used as a bibliometric indicator of conceptual influence within the APM domain (Hadjinicolaou & Dumrak, 2017). Highly cited sources were treated as foundational contributions and received greater analytical attention in the synthesis phase, as their findings are more likely to reflect settled consensus in the field.
- **Suitability Tier.** Each included WL source was assigned to one of three suitability tiers based on its PRISMA assessment outcome, quality score, and depth of RQ coverage.
 - **High Suitability:** Papers classified as "High" are those that received a "Yes" in PRISMA screening, achieved a high quality score, and offer clear, comprehensive coverage of all four RQs (Aghajani et al., 2023)
 - **Medium Suitability:** This rank is assigned to papers that meet the PRISMA inclusion criteria but provide more moderate or partial coverage of the RQs (Martina Ononiwu et al., 2025). These often have a narrower domain focus, such as specific industry-sector case studies (e.g., automotive or fintech), yet still offer valuable evidence for identifying Success Factors (SFs) or Success Criteria (SCs) in agile environments (Aghajani et al., 2023)
 - **Low Suitability:** Sources designated as "Low" are excluded from the final synthesis due to insufficient coverage of portfolio-level governance or poor alignment with the research's strategic objectives (Al Jabri et al., 2024; Batista et al., 2022).

This tiered sorting ensures that the final synthesis prioritizes the most influential and informative data, thereby maximizing the scholarly impact of the MLR (Kitchenham & Charters, 2007)

Filtering Criteria for Grey Literature

Grey literature filtering applied two criteria that parallel the WL approach but are adapted to the distinctive structural and credibility characteristics of practitioner sources (Garousi et al., 2019).

The GL-A through GL-E credibility scheme, grounded in Adams et al. (2017) and operationalised following Garousi et al. (2019), is defined in Section 3.5.3, where each tier is mapped to the AACODS Authority criterion. The scheme is used throughout the filtering and sorting criteria below.

- **Source Type.** Inclusion was restricted to formal framework documentation, professional body research reports, and practitioner-authored guides from recognised Agile portfolio governance authorities. Sources already excluded under the Exclusion Criteria (Section 3.4.2) are vendor promotional materials, anonymous content, and unverifiable informal sources were not carried forward. The source type filter maps directly to the GL credibility tiers GL-A through GL-E as described in Section 3.5.3.
- **AACODS Suitability.** Each candidate GL source was evaluated against the six AACODS criteria (Section 3.5). Inclusion required a minimum score of four out of six and substantive coverage of at least one of the four research questions. Sources scoring in the Low-quality band (one or two out of six), and sources meeting the minimum threshold but providing no substantive APM governance coverage, were excluded.

Sorting Criteria for Grey Literature

GL sources that passed the filtering criteria were sorted using two criteria to support differentiated weighting in the synthesis.

- **Organisational Authority.** The credibility and reach of the issuing organisation were used as a proxy for the epistemic weight of the GL source. Framework documentation from globally adopted Agile scaling frameworks (SAFe, LeSS, DA) and professional body publications from PMI and APM were treated as higher-authority sources than single-organisation case studies or consultant white papers, consistent with the GL authority criteria in the AACODS framework (Tyndall, 2008).
- **Suitability Tier.** GL sources were assigned to the same three-tier suitability classification used for WL. High-suitability GL sources achieved the maximum AACODS score of six out of

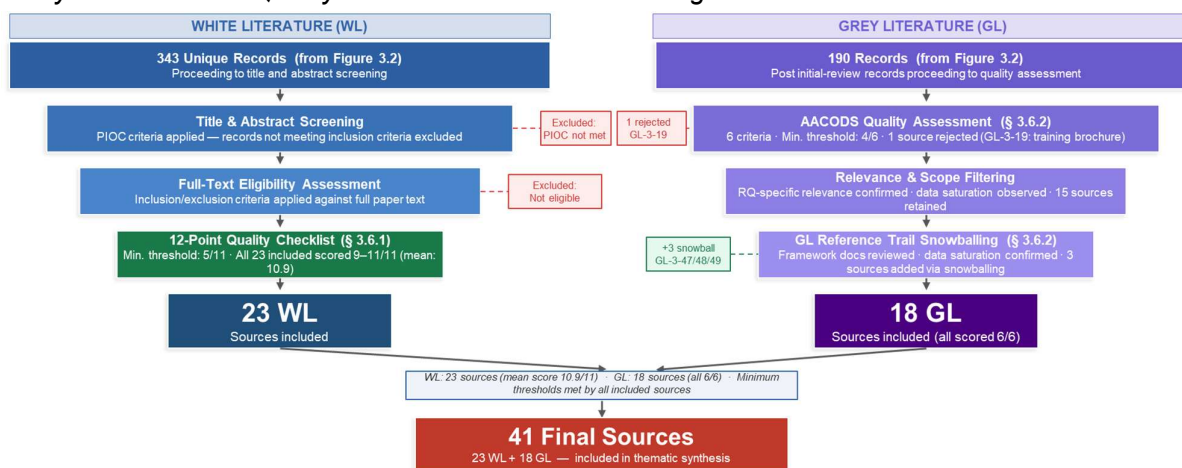
six, came from a GL-A credibility category, and addressed at least two of the four research questions directly. Medium-suitability sources met the minimum AACODS threshold and addressed at least one RQ but were narrower in scope for example, addressing portfolio financial governance but not portfolio coordination or alignment. Low-suitability sources failed either the AACODS threshold or the RQ coverage requirement and were excluded.

3.5.6 Quality Assessment Results

Following quality assessment and filtering, 23 White Literature sources and 18 Grey Literature sources met the inclusion thresholds and were carried forward to data extraction. **Figure 3-4** illustrates the full selection and quality assessment process as a PRISMA-adapted funnel diagram adapted from PRISMA 2020 (Page et al., 2021). The detailed quality assessment scores for all 41 included sources are presented in Appendix F.

Figure 3-4

Study Selection and Quality Assessment: From Screening to Final Inclusion



3.6 Data Extraction

After careful screening and selection of relevant literature, the primary aim of data extraction is to systematically isolate and record evidence related to the four foundational research questions. Data extraction was conducted using a standardised instrument developed and piloted on a sample of five sources (three WL, two GL) before application across the full included evidence base. The instrument was designed to isolate and record evidence directly relevant to the four research questions, following guidelines for data extraction in systematic literature reviews (Kitchenham & Charters, 2007; Olsen et al., 2025). For each selected paper, key details were recorded, including bibliographic information (such as authors, year, and publication source), research objectives,

methodology, key findings, and how the study relates to Agile Portfolio Management, governance practices, and strategic alignment.

Each source was read in full, and extracts were taken from any part that bore on the research questions. The section of origin (for example results, discussion or background) was not recorded, so these are not distinguished (see Section 6.6).

The extraction form serves as the primary instrument for mapping descriptive details and synthesizing analytic content, focusing on the following conceptual areas: To help organize this information, a data extraction template has been used based on the SLR guidelines of (Kitchenham & Charters, 2007). The full extraction instrument is presented in Appendix G.

Beyond recording descriptive information, the extraction process incorporated four interpretive steps designed to bridge data capture and thematic synthesis.

- **Verbatim Extraction:** The data extraction has captured direct quotes or specific empirical examples (e.g., "almost 50% of all active projects were highest priority" (Hoffmann et al., 2020) that illustrate the core concepts related to the four RQs.
- **Conflict Identification:** We have specifically noted any contradictions or tensions reported between the academic expectations for APM (rigor) and the practical enactment of APM (flexibility/politics) (Hoffmann et al., 2020).
- **Initial Thematic Linkage:** The assignment of the initial RTA(Reflexive Thematic Analysis)codes has been done, noting how the extracted evidence contributes to identifying *latent* themes (underlying beliefs, cultural shifts) versus *manifest* themes (formal procedures, metrics used) (Aghajani et al., 2023).
- **Metric Discrepancy:** We have documented instances where traditional metrics (e.g., compliance to plan, milestone reports) are explicitly reported as being non-value-adding, costly, or time-consuming when used with agile teams, contrasting these with successful, tailored agile delivery metrics (Aghajani et al., 2023).

This step supports the synthesis of a diverse body of literature, transparency and replicability in the research process (Garousi et al., 2019).

All extracted data were stored in a structured spreadsheet, with Zotero used for reference management.

3.7 Data Synthesis

Following data extraction, the next stage of the MLR process is data synthesis. It is the systematic combination and interpretation of findings from the included sources to address the four research questions. Thematic Analysis (TA) is a widely used method for identifying, analysing, and reporting patterns across qualitative datasets (Braun & Clarke, 2006). Its prevalence in software engineering research reflects its capacity to handle heterogeneous evidence ranging from empirical studies to practitioner documentation without requiring the methodological homogeneity that statistical aggregation demands. Cruzes & Dybå, 2011 found that thematic synthesis is the dominant approach in systematic literature reviews in software engineering.

TA can be applied inductively, letting themes surface from the data, or deductively, using a prior framework to structure the coding (Braun & Clarke, 2006, 2021b). Both modes of application are legitimate in reflexive TA; the choice depends on whether the researcher is generating theory from data or testing how data maps to existing theoretical categories (Braun & Clarke, 2006, 2021). This study applied the inductive mode to both streams. The White Literature was coded first, so that themes emerged from the academic evidence without pre-imposed categories. The Grey Literature was then coded in the same way, from its own extracts and without using the WL themes as a coding frame, which kept the vocabulary of practitioner sources. The WL and GL themes were compared only after both sets had been developed, and were combined within each research question (Section 3.7.3). Section 3.7.1 describes the specific variant applied here, Reflexive Thematic Analysis.

3.7.1 Reflexive Thematic Analysis

Thematic Analysis was selected as the data synthesis method for this study because it provides the flexibility to engage with heterogeneous evidence including academic papers, framework documentation, consultant reports, and practitioner case studies without forcing them into a single analytical template (Braun & Clarke, 2006). TA was preferred over Grounded Theory because the four RQs provide a structured analytical framework and prior literature establishes clear expectations about the governance mechanisms this study investigates. It was preferred over meta-analysis because the MLR evidence base lacks the methodological homogeneity meta-analysis requires (Cruzes & Dybå, 2011). This study employs Reflexive Thematic Analysis as theorised by Braun and Clarke (Braun & Clarke, 2019, 2021a). Reflexive TA differs from coding-reliability approaches in its epistemological positioning (Braun & Clarke, 2019, 2021a). It embraces the interpretive, constructionist nature of qualitative analysis rather than seeking to minimise researcher subjectivity through inter-rater reliability protocols (Braun & Clarke, 2019). In Reflexive TA, the researcher's

engagement with the data, their interpretations, theoretical commitments, and analytical decisions is a constitutive element of the knowledge produced, not a source of bias to be controlled (Braun & Clarke, 2021a). APM governance is a complex, contextually variable phenomenon where my background as an IT programme manager with ten years in large-scale Agile organisations provides genuine analytical insight that a purely detached coding approach would sacrifice. Reflexive TA makes this subjectivity methodologically productive by requiring me to document and interrogate analytical choices rather than conceal them (Braun & Clarke, 2021b; Finlay, 2002).

This chapter sits at the intersection of two philosophical traditions. As a Multivocal Literature Review, the study is grounded in positivist assumptions about evidence: a defined protocol, systematic search procedures, explicit inclusion criteria, and documented quality thresholds (Garousi et al., 2019). These mechanisms provide the epistemological foundation which is a structured, replicable process for assembling an evidence base. The analytical layer, Reflexive Thematic Analysis, operates from an interpretivist commitment, in which meaning is generated rather than found (Braun & Clarke, 2021b). This dual positioning that is positivist scaffolding for evidence collection and interpretivist orientation for meaning-making is consistent with Creswell and Poth's (2018) characterisation of pragmatic research designs that draw on multiple epistemological traditions without requiring full paradigmatic consistency (Creswell & Poth, 2018).

3.7.2 Steps in the Thematic Synthesis Process

The Reflexive TA process follows Braun and Clarke's (2006, 2021) six phased framework (Braun & Clarke, 2006, 2021b). **Table 3-1** provides description of all phases:

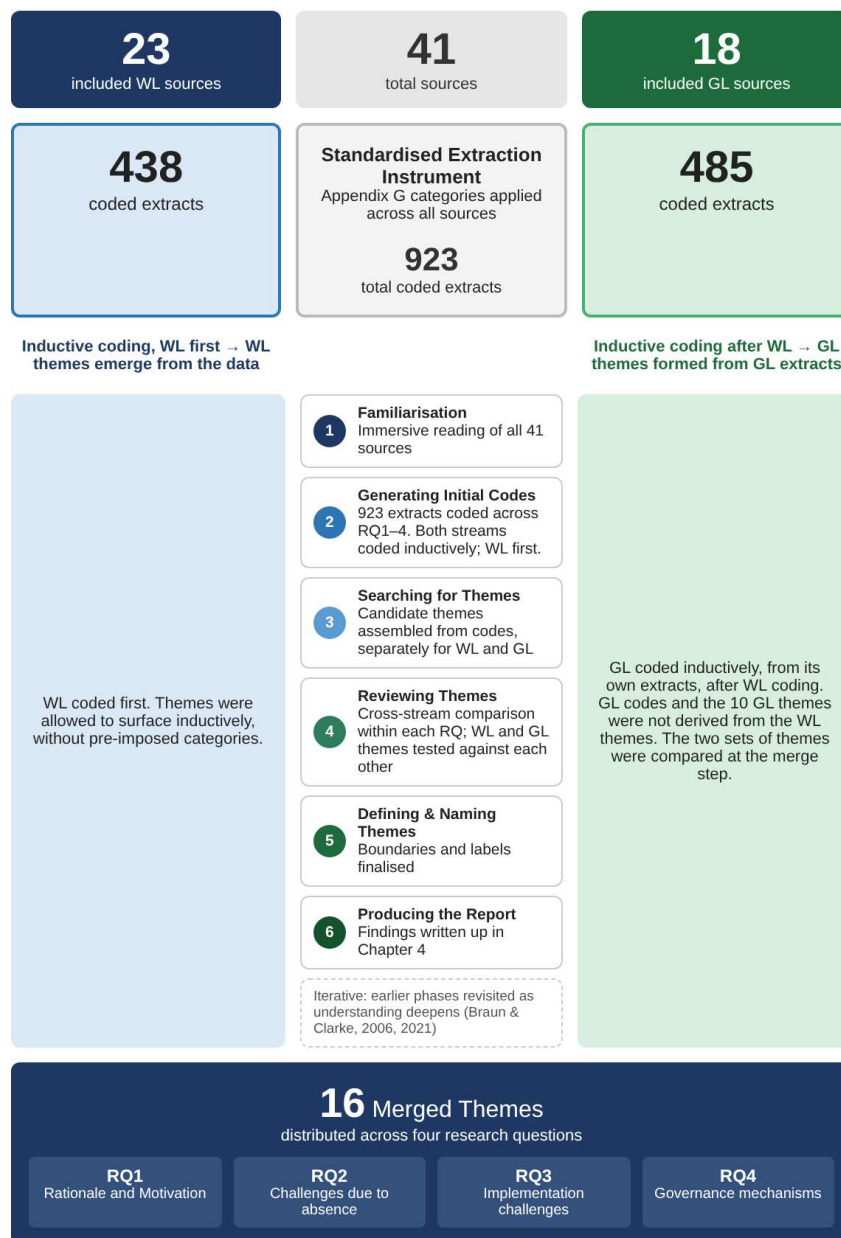
Table 3-1*Reflexive Thematic Analysis: six-phase process*

Phase	Phase Name	Description
Phase 1	Familiarization	Reading and re-reading all extracted data; documenting initial impressions, patterns, and analytical hunches before systematic coding begins.
Phase 2	Initial Coding	Open coding of data fragments, inductive in both streams (White Literature coded first). Output: 923 coded extracts across all four RQs.
Phase 3	Developing Descriptive Themes	Codes are grouped into surface-level themes describing what the evidence shows (e.g., adaptive portfolio steering, value stream coordination).
Phase 4	Generating Analytical Themes	Descriptive themes interpreted in relation to the four research questions and APM governance constructs. Output: 16 merged themes across RQ1–4.
Phase 5	Mapping to Research Questions	All analytical themes explicitly aligned to RQ1-4; cross-stream WL/GL comparison identifies convergence, divergence, and research-practice gaps.
Phase 6	Synthesis and Reporting	Findings are synthesized into the thematic structure reported in Chapter 4, supported by concept maps, thematic matrices, and summary tables.

Note: The process is iterative; earlier phases are revisited as analytical understanding deepens. Adapted from (Braun and Clarke, 2019, 2021).

Figure 3-5 captures the process from the 41 sources to the 16 merged themes. The side columns show that both streams were coded inductively and kept separate until their themes were compared within each research question.

Figure 3-5
Data extraction and data synthesis

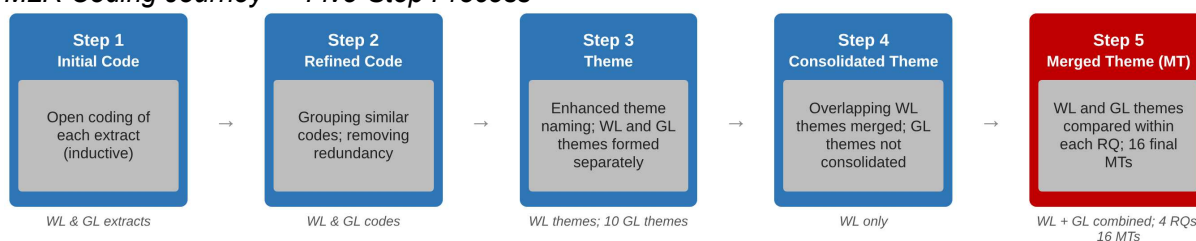


3.7.3 Applying Reflexive Thematic Analysis

Coding proceeded in five steps as captured by **Figure 3-6**. Initial coding produced granular descriptive labels close to the language of each source; refined coding grouped overlapping codes

into preliminary themes and revised labels to capture underlying concepts; enhanced theme naming reviewed and revised preliminary names to reflect the full scope of constituent evidence; and theme consolidation merged overlapping WL themes. The GL extracts followed the first three steps in the same way, with their own codes and themes, and these themes were not consolidated. The consolidated WL themes were then compared with the GL themes within each research question and combined into merged themes where they addressed the same governance challenge.

Figure 3-6
MLR Coding Journey — Five-Step Process



Each merged theme carries an MT code in the format MT[RQ].[sequence], used consistently throughout Chapters 4 and 5. The first digit identifies the research question; the second marks the theme's position within it. These codes serve a traceability function. Every analytical claim in Chapter 4 is anchored to a specific MT code, which traces back to the coded extracts from which it was built. White literature themes (for example, WL Theme 14) keep the numbers they were given at the enhanced-theme step. Because some themes were merged or dropped at consolidation, the 26 retained themes are numbered between 1 and 38 with gaps. Grey literature themes are numbered 1 to 10. The numbers are labels only and do not indicate rank or sequence.

Table 3-2 traces one white literature extract and one grey literature extract from the source text to the same merged theme, MT1.1. The extract in each column is the passage recorded during data extraction (Section 3.6), and the initial code is the first label given to it. Every row of the coding workbook records these steps, so any extract can be followed back in the same way. In the white literature example, WL Theme 22 (Portfolio Value Optimization) was merged at the consolidation step into WL Theme 23 (Portfolio-Level Agility & Value); 18 of the 45 MT1.1 extracts in WL Theme 23 came from WL Theme 22. Grey literature themes were not consolidated further. GL Theme 3 (Strategic Resilience & Stewardship) joined WL Themes 5 and 23 in MT1.1 because the white and

grey literature themes in MT1.1 address how portfolio management translates strategy into investment decisions (**Table 4-1**).

Table 3-2

Worked trace from coded extract to merged theme (MT1.1)

Step	White literature example	Grey literature example
Source	EBSCO-RQ1-2 (Ershadi et al., 2020)	GL-3-47 (<i>Why Portfolio Management?</i> , n.d.)
Coded extract	"The portfolio management targets achieving the best combination of projects and programs despite limited resources and a set of capabilities to be built upon"	"Not only do you invest in new initiatives, you must also prune initiatives that no longer reflect your strategy."
Research question	RQ1	RQ1
Initial code	Effective project combination despite constraints	Prune initiatives that no longer align with strategy
Refined code	Constrained project combination optimization	Strategic-Operational Synchronization
Theme (enhanced theme naming)	WL Theme 22: Portfolio Value Optimization	GL Theme 3: Strategic Resilience & Stewardship
Theme consolidation	Merged into WL Theme 23: Portfolio-Level Agility & Value	Not applicable (GL themes were not consolidated)
Merged theme	MT1.1: Portfolio Value Realization Through Strategic Alignment	MT1.1: Portfolio Value Realization Through Strategic Alignment

Note. Labels are shown as recorded in the coding workbook (WL Coded Extracts row 301; GL Coded Extracts row 47). WL = white literature; GL = grey literature. Source identifiers are explained in Section 4.1.

A GL/WL ratio is reported for each theme in Chapter 4 as a descriptive signal; Section 4.2 sets out its limits.

3.7.4 Research Trustworthiness

Research quality in a qualitative, literature-based study is evaluated against criteria appropriate to its paradigm rather than the reliability and validity criteria associated with quantitative research. Lincoln and Guba's (1985) trustworthiness framework identifies four criteria: credibility, transferability, dependability, and confirmability (Lincoln, 1985).

Credibility (the qualitative equivalent of internal validity) is addressed through the systematic, protocol-driven approach to source selection and quality assessment, which minimises selection bias and ensures that the evidence base is representative of the available literature on APM governance. The audit trail, which records each coding and merging step, further supports credibility

by making interpretive reasoning open to scrutiny. Supervisory review of the protocol, quality assessments, and borderline analytical decisions provides an additional check on the reasonableness of the interpretations reached.

Transferability (the qualitative equivalent of external validity) is supported by the breadth of the MLR evidence base, which spans multiple organisational contexts, sectors, and geographic locations. While the findings cannot be generalised in the statistical sense, the diversity of the source literature enables the identification of patterns likely to be relevant across a range of large-scale Agile environments.

Dependability (the qualitative equivalent of reliability) is supported by the detailed protocol documentation in this chapter, which provides sufficient information for the study to be replicated or audited. The use of Zotero for reference management and a structured spreadsheet for data extraction provides an auditable chain of evidence from source identification through to thematic synthesis. The protocol (Appendix A), the quality assessment instruments (Appendix E) and the data extraction instrument (Appendix G) are included in this thesis and are also available on request.

Confirmability (the qualitative equivalent of objectivity) is addressed through the researcher positionality statement in Chapter 1 and explicit documentation of where analytical interpretations extend beyond what the evidence directly supports. The goal is not to eliminate researcher subjectivity, which would be impossible and epistemologically incoherent in interpretivist research, but to ensure that subjectivity is visible and managed through systematic reflection. Threats to validity are mapped to the categories of Wohlin et al. (2024) in Section 6.6.

My positionality warrants specific attention here. Ten years as an IT programme manager working in large-scale Agile organisations gives me both analytical depth and potential blind spots. The practitioner background enables finer-grained interpretation of grey literature; I can usually tell when practitioner accounts are presenting idealised prescriptions versus what actually tends to happen in complex organisational environments. The risk, as Walsham (1993) notes, is that familiarity produces taken-for-granted assumptions imported into the analysis unreflectively (Walsham, 1993).

Three strategies managed this risk. First, inductive coding of White Literature was conducted before coding the Grey Literature, allowing the academic evidence to establish interpretive anchors before practitioner knowledge was integrated. Second, the supervisory review process provided an external check by researchers without the same practitioner background. Third, the audit trail records how each code, theme and merged theme was reached, so that interpretations that drew on practitioner

experience can be checked against the extracts. Reflexive memos were not kept, and this is noted in Section 6.6.

3.8 Chapter Summary

This chapter set out the MLR design, the dual-stream search and selection of sources, the two quality assessment instruments, the extraction instrument, Reflexive Thematic Analysis and the criteria for judging trustworthiness.

Chapter 4 presents the findings by research question (Sections 4.3 to 4.6), with a cross-theme analysis in Section 4.7. Interpretive commentary is presented as a reading of the evidence across sources and not as an assessment of individual sources (Section 3.7.1).

Chapter 4 Results

4.1 Introduction

This chapter reports the results of the Multivocal Literature Review (MLR) carried out as part of this thesis. The review was structured to bridge the "rigor-relevance gap" by integrating academic insights with the lived experience of practitioners (Garousi et al., 2019). The findings are organised around the four approved research questions. The synthesis draws on 23 white literature (WL) sources and 18 grey literature (GL) sources, producing 923 initial coded extracts in total. Using reflexive thematic analysis following (Braun & Clarke, 2006, 2021b), the coded extracts were synthesised through a four-step process: initial coding, refined coding, enhanced theme naming, and theme consolidation, all conducted by the researcher from the data.

Source traceability is maintained through the accompanying audit trail (*MLR_Merged Themes for finding chapter.xls*) and the MT identifiers used throughout this chapter correspond directly to those in the audit trail.

The resulting 26 WL consolidated themes and 10 GL themes were then compared across each Research question to produce 16 merged themes (MTs). Appendix J defines each of these themes, and Tables 4-1 to 4-4 show which of them contribute to each merged theme. For each merged theme, the narrative synthesis integrates WL and GL evidence and notes where the two converge or diverge, and what any divergence suggests about the current state of APM knowledge

Throughout this chapter, coded extracts are attributed to their source by the identifier used in the coding spreadsheet, followed by the author-date citation in APA 7 form (for example, Scopus-164 (Stettina & Hörz, 2015), Scopus-7 (Alves & Gonçalves, 2023) and GL-3-47 (Why Portfolio Management? n.d.)). This combined form departs deliberately from standard APA, which uses the author-date citation alone. The identifier links each statement to the coded extracts in the audit trail, and the author-date citation links the identifier to the reference list by author name. Where only the number of extracts from a source is reported, the identifier is given alone. Chapters 3 and 5 follow the same convention where they cite corpus sources. Grey literature sources are prefixed GL, and white literature sources carry a database prefix (Scopus, EBSCO or IEEE) with an assigned numeric identifier. Appendix F lists each identifier with its document title and author or organisation.

Extract counts and GL:WL ratios are descriptive; Section 4.2 sets out what they can and cannot show.

The coded extracts cited throughout this chapter are representative samples from within each merged theme, not exhaustive inventories. Sources are cited where they state the theme directly. Many other sources within the same theme make related arguments in less explicit terms, and their contribution is captured in the theme counts rather than the narrative text. The narrative is therefore an interpretation of the full evidence base, not a summary of the specific sources cited. The findings can be traced to the coded extracts through the audit trail, providing a robust baseline for understanding the reconciliation of alignment, efficiency, and agility in the modern digital paradigm (Garousi et al., 2019; Hoffmann et al., 2020; Kitchenham & Charters, 2007).

The chapter is organised by research question: Section 4.3 addresses RQ1 (the need for APM), Section 4.4 addresses RQ2 (challenges in the absence of APM), Section 4.5 addresses RQ3 (barriers to implementation), and Section 4.6 addresses RQ4 (governance structures and mechanisms). Section 4.7 consolidates the findings across all 16 themes and presents the cross-stream pattern analysis.

4.2 Structure of the Evidence Base

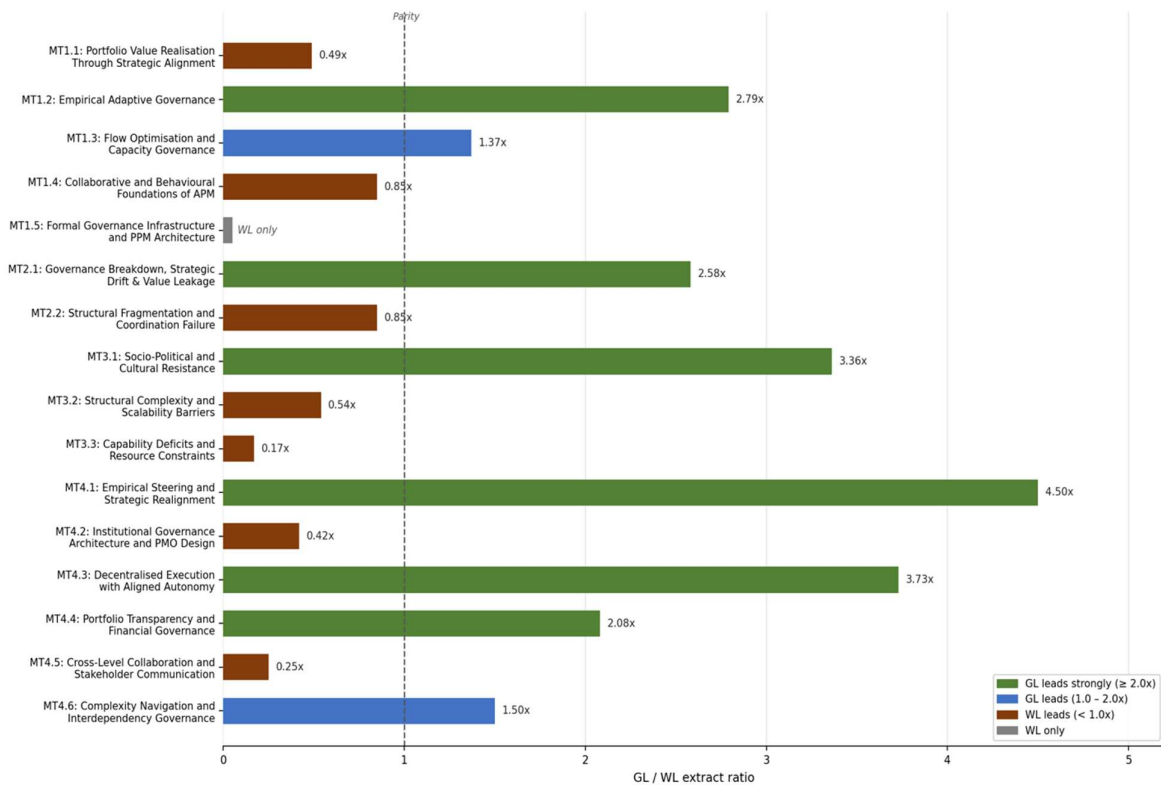
The MLR sources span around peer-reviewed journals, conference proceedings, practitioner white papers, framework documentation, and industry reports published between 2000 and 2025. Academic sources originate from a range of outlets including the IEEE Explore, ACM, SCOPUS and EBSCO. The GL literature skews toward large-enterprise implementation contexts, reflecting the organisations for which these sources were primarily produced. This contextual skew is noted where it is relevant to the interpretation of specific themes.

The 923 coded extracts are distributed unevenly across the four RQs: RQ1 yielded the most extracts (369), followed by RQ4 (307), RQ2 (128) and RQ3 (119). This distribution may reflect the emphasis that the source literature places on each question, but it also depends on how many extracts were coded from each source, as discussed below. Extract counts are reported as descriptions of the coded corpus. They show how many extracts were coded to a theme, and the audit trail shows which sources supplied them. They are not used as evidence that one theme matters more than another, because in reflexive thematic analysis a theme is judged by what it captures about the research question and not by how often it occurs (Braun & Clarke, 2006, 2021b). Extracts Count help to make the coding traceable, to compare the WL and GL contributions, and to identify thinly evidenced areas such as MT4.5 and MT4.6. Their limits come from how the extracts are distributed. The 41 sources contributed between 4 and 82 extracts each (median 19), and the three most productive sources (GL-3-26, GL-2-02 and GL-2-18) supplied 210 of the 923 extracts (23%). In five themes (MT1.5,

MT3.3, MT4.1, MT4.3 and MT4.4), a single source supplied between 29% and 43% of the extracts, whereas MT1.1 draws on 33 sources and none supplies more than 7% of its extracts. A source that treats a topic at length can also yield more extracts than one that states it briefly. Extract counts are therefore read here as descriptive signals about this corpus, together with the number of sources behind each theme.

The GL/WL ratio, that is, the ratio of grey literature to white literature extracts, varies substantially across the 16 merged themes. **Figure 4-1** presents this ratio analysis, which is a distinctive analytical contribution of the MLR methodology. Where the ratio exceeds 1.0, more GL than WL extracts were coded to the theme. Where it falls below 1.0, more WL extracts were coded. The pattern is neither random nor symmetrical. It may reflect a knowledge asymmetry in the APM domain, in which many governance mechanisms are documented mainly by practitioners, although other explanations are considered below. The highest GL:WL ratio in the review (4.5:1 in MT4.1) suggests that the operational mechanisms of adaptive governance are documented more often in the GL sources included here, although one source (GL-2-02) supplied 47 of the 110 extracts in this theme. The lowest ratio (0.0 in MT1.5) reflects that the rationale for formal governance structures and PMO infrastructure was coded only from academic sources. .

Figure 4-1
GL/WL ratio across all 16 merged themes



Note. Themes above the parity line (1.0x) have more GL than WL extracts; themes below it have more WL extracts. MT4.1 has the highest ratio (4.5x).

The GL:WL ratio describes the balance of coded extracts in the evidence base and is not a direct measure of which community holds more knowledge. A ratio above 1.0 is consistent with practitioners documenting a topic ahead of the academic literature, but other explanations are also possible. First, the search design differed between streams. The GL search covered five named practitioner platforms and stopped at 50 results per platform (Section 3.3.3), whereas all database results in the WL stream were exported and screened (Section 3.4.3). Second, publication practices differ. Practitioner documents in this corpus often describe practices in operational detail (Section 4.3.2), which can yield more extracts per source than a research paper. Third, availability differs. Material that was not openly accessible could not be included (Section 3.4.1), and the GL stream skews toward large-enterprise contexts. Fourth, a few sources influence the ratio. The corpus has fewer GL sources than WL sources (18 and 23) but more GL extracts (485 and 438), because GL sources yielded 27 extracts each on average and WL sources 19. Three GL sources supplied 210 of the 485 GL extracts, and the other 15 averaged 18 each. The ratios are therefore reported as descriptive signals about the included studies.

4.3 RQ1: What is the need to adopt portfolio management in large-scale Agile software development?

RQ1 yielded the most coded extracts in this MLR (369) and examines why portfolio management is needed in large-scale Agile Software Development (LSASD). The split between WL (n=199) and GL (n=170) extracts suggests that both the academic and practitioner communities have documented the rationale for an enterprise-level coordination layer. The synthesis of this evidence yielded five merged themes (MT1.1–MT1.5), as summarized in **Error! Reference source not found.**, which detail the intersections between strategic alignment, resource orchestration, and behavioural enablers. These themes describe a shift from static, annual planning to the "actuality" of adaptive governance, where portfolio management links high-level strategy to distributed team execution. **Figure 4-2** summarizes the ration of GL vs WL extract for five merged themes.

Table 4-1*Consolidated Thematic Analysis for RQ1: Rationale for Adopting Agile Portfolio Management (n=369 coded extracts for this theme)*

Merged Theme	WL themes and representative initial codes	GL themes and representative initial codes	Rationale for Inclusion (Merged Theme)	WL	GL	Total
MT1.1 Portfolio Value Realization Through Strategic Alignment	<ul style="list-style-type: none"> • WL Theme 5: Strategy-execution translation (n=33) Strategic Alignment; Investment Strategy; Strategic Product Backlog; PPM as Strategy Alignment; Strategic portfolio alignment • WL Theme 23: Portfolio-Level Agility & Value (n=45) Respond to Market changes; Organization Performance; Enabling Agility to be on top; Maximizing financial value; Effective team coordination; Project Value modularization 	<ul style="list-style-type: none"> • GL Theme 3: Strategic Resilience & Stewardship (n=34) Business Driven Team collaboration; Enable organizational future; Continuous strategy alignment; Prune initiatives that no longer align with strategy; PPM provides initial vision • GL Theme 5: The Financial Translation Layer (n=4) Common Language established; Shift to Business-Term Costing; Common Language Creation; Value Maximization with Limited Resources 	These themes are merged because WL evidence establishes strategy-execution translation as the analytical backbone of APM's value rationale, while GL evidence confirms this operationally and adds the financial-translation layer that practitioners identify as decisive but academic literature underrepresents.	78	38	116
MT1.2 Empirical Adaptive Governance	<ul style="list-style-type: none"> • WL Theme 1: Adaptive Portfolio Governance (n=19) PMO for project prioritization; Market-driven flexible project re-prioritization; Agility to sense and implement changes; Dynamically change based on market trends; Dynamic Prioritization; 	<ul style="list-style-type: none"> • GL Theme 1: From Predictive to Empirical Steering (n=62) Iterative feedback; Increased portfolio decision cadence; Alignment with customer's need; Quick time to market; Lean portfolio management to maximize sustainable value; 	WL themes define the formal adaptive-governance mechanisms and their risk dimension; GL themes supply the operational specificity (Portfolio Kanban, empirical cadences), the measurement	24	67	91

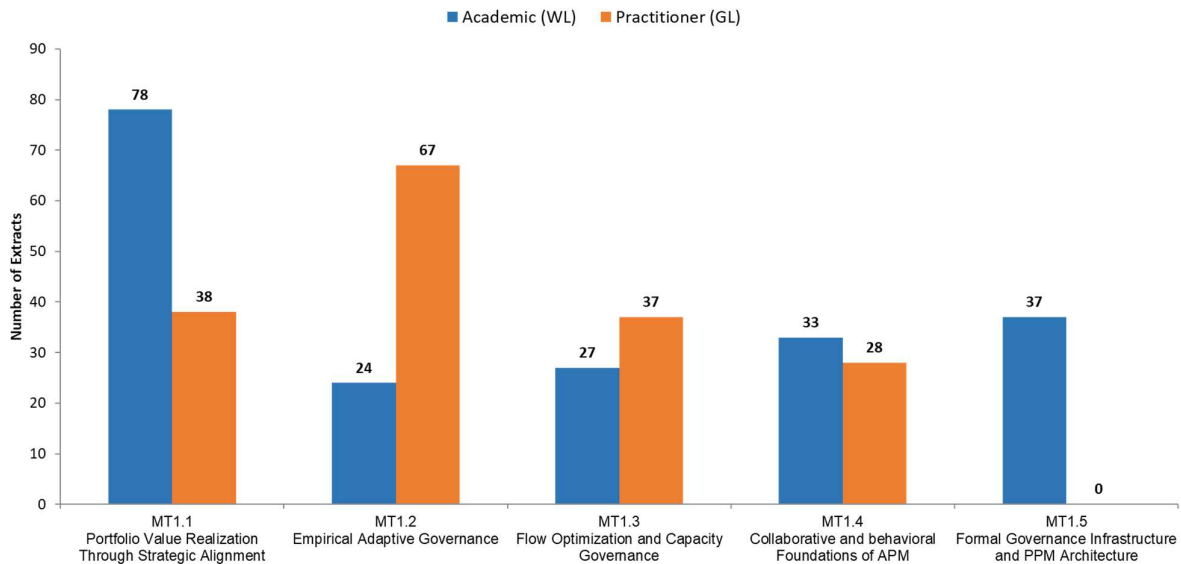
	<p>Dynamic Strategy adjustments</p> <ul style="list-style-type: none"> • WL Theme 19: Portfolio risk optimization (n=5) Balanced project risk; Overall Risk and reward Analysis; PPM as a Risk Realizer; Risk Mitigation 	<p>Dynamic Reassessment of investments</p> <ul style="list-style-type: none"> • GL Theme 7: Algorithmic Governance (n=4) Cost vs Value discussion; Multi-dimensional Value; Hypothesis of Value Creation; PPM for maximizing value • GL Theme 10: Empirical Learning Culture (n=1) Innovation environment due to learning capability 	<p>infrastructure, and the learning-culture prerequisite that keeps governance genuinely empirical.</p>			
MT1.3 Flow Optimization and Capacity Governance	<ul style="list-style-type: none"> • WL Theme 3: Capacity Constrained Delivery Pressure (n=18) Effective Resource allocation; Effective resource allocation; Effective resource management; Balancing organizational resource capacity; Coordinated resources; High Workload Pressure • WL Theme 21: Portfolio transparency and visibility (n=9) Improved visibility of projects; Global Resource view; Transparency of resources and work items; Enabling transparency; Shared objectives 	<ul style="list-style-type: none"> • GL Theme 2: Operationalizing Flow & Capacity (n=34) Strategic backlog as portfolio artefact; Conflicting resource demands; Efficient resource management; Capability-Centric Strategy Container; Strategic Work-in-Process (WIP) Focus • GL Theme 8: Relentless Operational Excellence (n=3) Effective Learning opportunities; Customer Oriented success; Customer Experience Priority 	<p>WL themes establish resource-capacity demand and the visibility required to manage it; GL themes supply the concrete operational artefacts and sustained continuous-improvement discipline that make capacity governance effective in practice.</p>	27	37	64

MT1.4 Collaborative and behavioral Foundations of APM	<ul style="list-style-type: none"> • WL Theme 4: Cross-level collaboration patterns (n=13) Effective communication; Team Communication and coordination; Continuous collaboration; Improved Team Communication and Alignment; • WL Theme 6: Customer-centric value delivery (n=3) Continuous Customer Feedback; Customer collaboration; Principle of success: Stakeholder satisfaction • WL Theme 7: decentralized execution patterns (n=6) Team coordination; Informal and non-codified communication; Project as collection of activities; Increased delivery predictability • WL Theme 12: Organizational learning enablement (n=1) • New Knowledge generationWL Theme 15: Portfolio complexity management (n=9) Maintaining Heterogeneous IT projects; Monitoring interdependent initiatives; 	<ul style="list-style-type: none"> • GL Theme 4: Behavioral & Institutional Anchors (n=23) Improved Team Communication and Alignment; Prioritization and Adaptability; Single integrated portfolio; Transparency of resources and work items; Effective decision making • GL Theme 6: Product-Centric Stewardship (n=4) Cross Functional Collaboration; Project-to-Product Shift; Product over project orientation; Product Mindset for Organizational success • GL Theme 9: Paradox Management (n=1) Innovation as strategy enabler 	WL themes map the communication architecture, decentralized-execution design, complexity management, and customer-value orientation that collaborative governance requires; GL themes ground this in the cultural, institutional, and paradox-management conditions that make it operate in practice.	33*	28	61*
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	Interdependencies among projects; Portfolio fit for heterogeneous subprojects; Resource dependency and portfolio management						
MT1.5 Formal Governance Infrastructure and PPM Architecture	<ul style="list-style-type: none">• WL Theme 16: Portfolio governance structures (n=27) Portfolio vision by PMO; PMO as an Efficient Resource allocation; PMO as an investment decision authority; PMO as Value-stream funding lead; Strong Portfolio Managers; Effectiveness of PPM Methodologies• WL Theme 1: Adaptive Portfolio Governance (n=10) Multi-project management and control; Portfolio monitoring for risk awareness; Dynamic portfolio re-prioritisation	—		The WL evidence establishing formal PMO governance infrastructure as an adoption rationale for APM; no corresponding GL theme was identified.	37	0	37

Note. Theme numbers are labels only from the consolidation step and do not indicate rank (see Section 3.7.3).

Figure 4-2
RQ1 Extract Counts by Merged Theme (Academic vs Practitioner)



4.3.1 MT1.1: Portfolio Value Realisation Through Strategic Alignment (n = 116)

MT1.1 draws together two complementary white literature themes: Theme 5 (Strategy-execution translation), which addresses how portfolio management operationalises abstract strategy into concrete resource allocation and prioritisation decisions, and Theme 23 (Portfolio-Level Agility & Value), which captures portfolio management's role in extending agility and benefit realisation beyond individual teams to the organisational level. The grey literature contribution comes primarily from Theme 3 (Strategic Resilience & Stewardship) and Theme 5 (The Financial Translation Layer), providing the practitioner perspective on strategic stewardship and the financial mechanisms through which strategy is translated into investment decisions across the portfolio.

MT1.1 has the most extracts of any merged theme (116: 78 WL, 38 GL). The 116 extracts come from 33 sources (22 WL, 11 GL); no source supplies more than 7%. Across both streams the extracts treat strategy-execution translation as the core rationale for APM, and the grey literature adds a financial-translation layer that the white literature covers less.

The academic framing tends to treat strategic alignment as a structural problem however, the portfolio is the mechanism through which abstract organisational strategy is translated into concrete decisions about resource allocation, project selection, and prioritisation. The prevailing rationale for adopting portfolio management resides in the fundamental necessity of translating organizational strategy into an executable, value-optimized configuration of set of initiatives (Archer &

Ghasemzadeh, 1999; Cooper et al., 2001). This consensus, which remains robust across disparate source types and national contexts, establishes that portfolio management connects strategic intent to operational delivery. The core claim is straightforward: portfolio management links strategic intent to deliver decisions. Without it, project selection follows other logics like budget cycles, political influence, historical inertia rather than current strategic priorities.

Stettina & Hörz, 2015 characterize this function as the critical feature that links organizational strategy directly to the distribution of resources across all constituent projects. Their study of portfolio management practice across multiple organisations found that PPM links "organisational strategy to the distribution of resources across projects in the portfolio" (Stettina & Hörz, 2015). This mechanism addresses the fundamental distinction between "doing the right projects" and "doing projects right" (Archer & Ghasemzadeh, 1999). This framing positions portfolio management not as a project coordination mechanism but as a strategic governance mechanism where its primary function is to ensure that the collective set of investments which the organisation is making is the right set, not merely to coordinate the execution of whatever investments have already been decided. (Stettina & Hörz, 2015) go further in their empirical analysis, identifying the absence of this translation function as a primary driver of resource misallocation. Organisations with strong project delivery capabilities but weak portfolio governance consistently allocate those capabilities to the wrong work. As per studies, an organisation can have excellent delivery capability and still consistently deliver the wrong things if its portfolio selection is poorly governed. Without effective portfolio governance, organizations possessing superior delivery capabilities may still suffer from significant value leakage by consistently allocating resources to the wrong initiatives (Stettina & Hörz, 2015). This is the analytical move that justifies treating PPM as something other than a more sophisticated form of project management.

Value optimisation, as it appears in the evidence, takes several forms. Within the literature, the optimization of value is operationalized as a process of determining the "optimal mix" of current and proposed projects to maximize strategic contributions while navigating systemic resource constraints (Cooper et al., 1999). This involves the continuous balancing of shared resources and risks to achieve emergent strategic alignment. Newer sources add a temporal dimension that earlier WL evidence does not address explicitly. (Leffingwell, 2019) distinguishes between investments that fund the organisation today, medium-term bets it hopes will grow, and long-term innovations that may redirect the organisation entirely. That three-horizon structure addresses a governance challenge single-cycle portfolio models do not handle well: how to maintain strategic coherence across investments with very different time horizons and uncertainty profiles.

Several sources in this theme address the financial dimension of value translation in subtly different ways. Scopus-7 (Alves & Gonçalves, 2023) notes that portfolio management goals include "the maximisation of the portfolio's financial values," a claim that recurs in the academic literature and that, on its surface, looks unremarkable. What makes it interesting is what practitioners add to it. GL-2-18 (Accelerating Business Value with SAFe® and Technology Business Management, 2020) argues that IT organisations need to shift toward "IT cost-to-value alignment," a reframing that changes the entire portfolio question from "how do we allocate our budget across projects?" to "how do we demonstrate that our investments generate business value?" GL-3-33 (*Innovation, Portfolio Management, and Agility as a Happy Family*, n.d.) picks up the same thread, arguing for "value maximisation with limited resources" and positioning APM as the governance mechanism that makes value-based trade-offs possible at portfolio level. This is meaningfully different from the structural translation argument in the academic literature; it puts value measurement, not just alignment, at the centre of the portfolio function.

4.3.2 MT1.2: Empirical Adaptive Governance (n = 91)

MT1.2 addresses the governance mechanisms through which APM makes portfolios responsive and evidence based. All five contributing themes share a common logic: replacing fixed, plan-driven portfolio decisions with iterative, data-informed reconfiguration. The GL themes dominate the evidence (GL/WL = 2.79) because practitioners have developed the most operational specificity around these mechanisms.

MT1.2 synthesises Theme 1 (Adaptive Portfolio Governance), which captures the full range of iterative portfolio-level decision-making and continuous re-prioritisation mechanisms, and Theme 19 (Portfolio risk optimisation), which addresses risk balancing as an integral component of adaptive governance rather than a separate activity. The grey literature contribution draws from Theme 1 (From Predictive Control to Empirical Steering), the GL theme with the most extracts in the review, alongside Theme 7 (Algorithmic Governance) and Theme 10 (Empirical Learning Culture), which together provide the operational depth on empirical steering practices and the learning culture that sustains them.

The 91 extracts (67 GL, 24 WL) come from 33 sources (17 GL, 16 WL); no source supplies more than 11%.

The academic discourse on this theme is primarily grounded in the pressures of market dynamics. The academic sources do address the problem. SCOPUS-RQ2-13 (Hoffmann et al., 2020) argues that: "market dynamics driven by disruptive digital innovation results in short-term cost pressures and increasingly jeopardizes alignment with long-term goals and objectives, which calls for an approach that allows for the flexible re-prioritization and selection of projects as needed." This describes the adaptive governance problem: the external environment moves faster than annual portfolio planning cycles, and organisations that cannot re-prioritise mid-cycle may find their investments misaligned. . Scopus-7 (Alves & Gonçalves, 2023) extends this point : "Successful organizations adopt an adaptive strategy approach as they revisit and revise strategies more frequently and use agile project management to execute in shorter cycles, allowing adjustments. [They] effectively treat strategy execution as a dynamic, agile portfolio rather than a static plan."

The practitioner literature translates this into operational terms. GL-3-20 (*Portfolio Management Practices*, n.d.) argues for "rolling wave planning over annual planning". This is a specific mechanism for implementing adaptive governance, where planning is continuous and iterative rather than fixed to an annual cycle. GL-3-47 (*Why Portfolio Management?*, n.d.) adds "dynamic reassessment of investments," and GL-3-26 (*Lean Portfolio Management-Maximizing Value Across Many Programs*, n.d.) introduces the idea of "finding the vital few" which is the principle that in any portfolio, a small number of initiatives will disproportionately determine strategic outcomes, and the governance system needs to be able to identify and protect those while stopping or redirecting the rest. GL-5-06 (*Value-Driven Digital Business*, n.d.) takes this further with what it calls an "envision-evolve approach," where portfolio commitments are treated as hypotheses to be validated incrementally rather than plans to be executed to completion.

From an operational standpoint, the academic literature increasingly argues that traditional Key Performance Indicators (KPIs), such as milestone compliance and rigid budget-to-plan tracking, are structurally incompatible with the realities of agile portfolios. EBSCO-19 (Rosenberger & Struzl, 2017) contributes the most operationally specific academic treatment in this theme, arguing that "classic KPIs such as budget-to-plan and milestone compliance are structurally unsuited to agile portfolios" and proposing agile-compatible alternatives such as capacity-based forecasting, velocity-based throughput measurement, and work-in-progress limits as portfolio-level governance instruments. This source is significant not only for its specific proposals but for its diagnostic clarity.

It identifies the metric mismatch as a root cause of governance dysfunction in organisations that have adopted Agile methods at the team level without adapting their portfolio-level measurement systems.

On the GL side, the Scaled Agile LPM Discipline documentation (Scaled Agile, Inc, 2023) and the DA portfolio management guide (Ambler & Lines, 2020b) operationalise adaptive governance through portfolio Kanban boards, hypothesis-driven investment decisions, and rolling-wave roadmaps. Instead of asserting that organisations should be 'more responsive', these sources describe the artefacts such as Kanban columns, lean budget guardrails, value stream KPIs and cadences including quarterly Strategic Portfolio Reviews, monthly LPM syncs through which responsiveness is enacted. (Leffingwell, 2019) describes quarterly planning cycles that replace annual planning events, arguing that "an unintended outcome of the annual cycle is an ever-widening gap between what delivery organisations are working on and what the business actually needs." This is a direct empirical claim about the consequences of annual planning, backed by implementation experience across large enterprises.

What unifies these practitioner sources is a particular critique of traditional planning. It mistakes a plan for a commitment, and that this mistake is costly in fast-moving environments. The academic literature identifies it as a structural problem with annual budget cycles SCOPUS-RQ2-13 (Hoffmann et al., 2020). The grey literature identifies it as a cultural and operational problem for organisations that treat the portfolio as a static artefact rather than a living system cannot respond to the opportunities and threats that emerge between planning cycles. GL-3-26 (*Lean Portfolio Management-Maximizing Value Across Many Programs*, n.d.) captures this with the phrase "shrinking the relevance gap," referring to the time between when an opportunity is identified and when the organisation can act on it. Reducing that gap is, in this reading, the core function of adaptive portfolio governance.

EBSCO-RQ1-2 (Ershadi et al., 2020) offers a useful summary of what adaptive governance enables operationally: "PPM plays a significant role in providing executives with a wide range of streamlined options to deal with strategic decisions on projects. These decisions include stopping the execution of specific projects, transferring their resources to other projects, giving higher priority to projects in a specific domain." This is the governance capacity that adaptive APM is meant to preserve and not just the ability to start the right projects, but the ability to stop the wrong ones and redirect resources mid-flight. That capacity, both literatures agree, is precisely what traditional annual-cycle PPM does not reliably provide.

4.3.3 MT1.3: Flow Optimisation and Capacity Governance (n = 64)

MT1.3 brings together Theme 3 (Capacity-Constrained Delivery Pressure), which encompasses the challenge of aligning project demand with available delivery capacity, and Theme 21 (Portfolio transparency and visibility), which provides the oversight mechanisms through which resource distribution and flow constraints become visible to governance bodies. The grey literature contribution comes from Theme 2 (Operationalizing Flow & Capacity) and Theme 8 (Relentless Operational Excellence), which translate these structural resource challenges into concrete flow-based delivery practices from the practitioner perspective.

The 64 extracts come from 27 sources (16 WL, 11 GL); no source supplies more than 19%. The white literature links resource-capacity demand to the visibility needed to manage it, and the grey literature adds the operational artefacts and continuous-improvement practice through which capacity governance works.

A primary benefit of this enterprise-level coordination is the mitigation of inter-program resource competition, which effectively transforms redundant overlaps into productive, value-generating interdependencies. Empirical evidence confirms that persistent resource contention and the "resource allocation syndrome" (Engwall & Jerbrant, 2003) where organizations over-commit beyond their actual delivery capacity and it serve as a primary impetus for adopting Agile Portfolio Management (APM) in contemporary practice (Stettina & Hörz, 2015). Engwall & Jerbrant, 2003 study identifies the specific mechanism where when individual project managers each make resource decisions that are locally rational, the collective outcome is irrational. Teams are over-committed, context-switching is excessive, and deadlines are missed across projects that all appeared adequately resourced in isolation. This systemic account of resource governance is what justifies treating capacity management as a portfolio-level problem rather than a project-level one.

Portfolio-level resource management is corroborated across multiple studies. EBSCO-RQ1-1 (Reyck et al., 2005) demonstrates that PPM provides a centralised view of all projects in an organisation, reducing inter-program competition for resources and enabling more effective cross-portfolio allocation. In larger organisations, portfolios commonly operate in a layered structure, with sub-portfolios aligned to business units or value streams nested within an overarching enterprise portfolio. The centralisation principle holds across these configurations, but the governance architecture through which it is enacted differs considerably in scale and complexity (Killen & Hunt, 2013). SCOPUS-RQ2-13 (Hoffmann et al., 2020) identifies that portfolio-level capacity balancing is required when market dynamics driven by disruptive digital innovation necessitate flexible re-prioritisation of projects mid-cycle. Scopus-128 (Aghajani et al., 2023) confirms that effective

resource allocation and risk management at portfolio level is a critical success factor for large organisations adopting agile portfolio practices.

Scopus-RQ1-33 (Laslo, 2010) frames portfolio resource governance as a "resource-constrained multi-project scheduling problem" requiring integrated planning that accounts for time-varying resource availability and periodic staffing changes. Resolving this challenge requires integrative planning models that calibrate hiring and releasing points for specialized experts while accounting for the stochastic nature of activity durations and the periodic flux of resource availability (Laslo, 2010).

Scopus-7 (Alves & Gonçalves, 2023) introduces a more critical note: "limited evidence shows how to continually solve problems originating at the portfolio level, and indicates that only half of organisations using PPM regularly track portfolio benefits." This suggests that even organisations with formal PPM practices often do not follow through on the tracking and governance that makes capacity management meaningful. It points to an implementation gap. The theory of resource governance through PPM is well established while the practice of doing it consistently is far less common. The GL sources echo this, with GL-3-26 (*Lean Portfolio Management-Maximizing Value Across Many Programs*, n.d.) noting the risk of a "vicious cycle" in which portfolio overload creates delivery pressure, which reduces the time available for governance, which leads to further overload. Breaking that cycle requires active portfolio-level capacity management, not just project-level resource planning.

GL-2-18 (Accelerating Business Value with SAFe® and Technology Business Management, 2020) describes work-in-progress limits as a portfolio-level flow control instrument, derived from Kanban theory. GL-3-26 (*Lean Portfolio Management-Maximizing Value Across Many Programs*, n.d.) reframes resource governance as a question of capacity allocation across value streams rather than across projects, which has the practical effect of making the portfolio's resource picture stable across project lifecycles.

4.3.4 MT1.4: Collaborative and Behavioural Foundations of APM (n = 61)

MT1.4 groups the human, cultural, and collaborative enablers that make APM viable as an organisational practice. These themes do not address the governance structures (MT1.5) or the empirical mechanisms (MT1.2) but the people-side foundations: how teams collaborate, how organisations learn, and how leadership behaviour enables or constrains portfolio agility.

MT1.4 draws on five white literature themes that collectively address the behavioural, collaborative, and relational conditions that make portfolio governance structures function: Theme 4 (Cross-level collaboration patterns), Theme 7 (Decentralised execution patterns), Theme 15 (Portfolio complexity management), Theme 12 (Organizational learning enablement), and Theme 6 (Customer-centric value delivery). The grey literature contribution comes primarily from Theme 4 (Behavioural & Institutional Anchors) which addresses cultural governance foundations and is supported by Theme 6 (Product-Centric Stewardship) and Theme 9 (Paradox Management).

The 61 extracts come from 28 sources (17 WL, 11 GL); no source supplies more than 9%. The white literature locates the enablers in communication, decentralised execution, complexity management and customer-value orientation, and the grey literature adds the cultural and institutional conditions in which they operate.

EBSCO-8 (Harake, 2025) captures the team-level dimensions: "instead of a project manager defining and delegating the tasks to the team, a backlog of all work items is created, and updated in each iteration. The team members then actively 'pull' their tasks from there." This is describing the shift from command-and-control to self-organising teams which is a shift that is well understood at the team level but which creates challenges when scaled to portfolio governance. At the portfolio level, the analogous shift is from hierarchical decision-making (executives define and delegate) to collaborative decision-making (portfolio boards, product owners, and teams jointly shape the backlog)(DingsØyr et al., 2018). IEEE-48 (Anam et al., 2024)) notes that "PPM can promote close cooperation between important players in software projects, such as product owners, user experience designers, and software engineers, by enhancing computational thinking and teamwork abilities." IEEE-47 (Svejvig et al., 2025) introduces a multidimensional success framework in which portfolio governance effectiveness depends on "stakeholder-centric success," "continuous flow and intensive interaction," and "uncertainty-embracing leadership" alongside formal process design. These are conditions without which the structural model does not function as intended.

IEEE-03 (Bechtel et al., 2022) adds something structurally important about when Agile projects sit inside non-Agile portfolio governance, "portfolio-level contingencies actively shape how Agile methods are applied at the project level." Portfolio governance is not a neutral coordination layer above teams; it is a context-shaping force that either enables or constrains the agility teams are supposed to have. This observation matters because it identifies portfolio governance as a potential inhibitor of team-level Agile as well as a potential enabler, a point that is often absent from the prescriptive APM literature.

DingsØyr et al., 2018 ground the interdependency dimension empirically, observing that "effective portfolio management is critical for managing the exponential growth of interdependencies and mitigating associated risks" in large-scale Agile environments Scopus-60(DingsØyr et al., 2018). This empirical anchoring matters because the rest of the literature on interdependencies tends toward the abstract. DingsØyr et al., 2018 work grounds the interdependency argument in very practical phenomena: shared infrastructure, common architectural components, and overlapping personnel. These are the things that turn nominally independent projects into a single, tightly coupled portfolio

Cross-functional collaboration and real-time coordination are further evidenced in the WL. EBSCO-RQ1-2 (Ershadi et al., 2020) identifies real-time cross-functional collaboration as a critical success condition for portfolio management systems, noting that without coordination mechanisms between business and delivery functions, portfolio-level decisions fail to translate into consistent execution. IEEE-13 (Vazifeh-Noshafagh et al., 2022) extends this to customer collaboration in portfolio management, demonstrating that portfolio fit for heterogeneous subprojects improves when customer feedback mechanisms are embedded in the governance cycle rather than deferred to project closure

Scopus-7 (Alves & Gonçalves, 2023) captures the organisational learning dimension: "New knowledge is generated by the organisation's ability to integrate different dispersed understanding in innovative ways." Delivery teams provide direct evidence of technical execution. Product owners delineate emergent customer requirements. Portfolio managers navigate strategic alignment and resource constraints. Institutionalised collaborative mechanisms, including joint planning events, rolling-wave road mapping, and frequent portfolio reviews, are critical knowledge-sharing nexus points.

GL evidence in MT1.4 is qualitatively different from the academic evidence. Where the WL describes interdependency in structural terms, the GL describes it in relational terms. Atlassian talks about "trust as the medium of governance"; (*Implications of Tech Stack Complexity for Executives*, n.d.) frames cross-functional alignment as "the work of building shared meaning across functional silos." This is not the language of structural governance; it is the language of organisational practice. Both are correct, and both are required for an account of governance that does not collapse into either structuralism or culture-talk.

4.3.5 MT1.5: Formal Governance Infrastructure and PPM Architecture (n = 37)

While the previous themes discuss why portfolio management is needed and what it should do, MT1.5 addresses the more formal question of what institutional machinery needs to exist for portfolio management to have genuine authority. This includes the structures that give portfolio decisions organisational standing: Portfolio Management Offices, governance bodies with defined mandates, standardised processes, and clear accountability for portfolio-level choices. Without these structures, portfolio management remains an advisory function that can be ignored when it is inconvenient.

MT1.5 draws entirely from Theme 16 (Portfolio governance structures), which addresses the formal institutional infrastructure such as PMO roles, governance bodies, standardised processes, and procedural architecture that gives APM institutional standing within the organisation. The complete absence of grey literature contribution to this theme reflects a meaningful disciplinary division that practitioners tend to treat governance structures as an RQ4 design question about what effective governance looks like in operation, rather than an RQ1 rationale for why such governance is needed at all.

This is the smallest RQ1 theme with WL extracts and no GL representation. The 37 extracts come from 11 white literature sources; Scopus-119 supplies 11 of them. This absence is analytically significant. Practitioners do not discuss PMO structures as reasons to adopt portfolio management. They discuss them as design questions for how to implement the governance structures. The complete absence of GL contribution to this theme indicates a genuine divergence in how the two knowledge communities frame the governance infrastructure question.

The academic literature characterizes the portfolio layer through its foundational institutional foundations, emphasizing the necessity for centralized accountability and a standardised procedural infrastructure. EBSCO-RQ1-1 (Reyck et al., 2005) positions formal governance as foundational. The portfolio level is characterised by "ensuring accountability and governance at the portfolio level" and "providing support in the form of standardised processes and software tools." EBSCO-RQ1-2 (Ershadi et al., 2020) offers a more theoretical framing, describing a conceptual framework that positions BPM (Business Process Management) and PPM in relation to "three aspects of a PPM system: structure, infrastructure, and process." Within this framing, Project Portfolio Management (PPM) is conceptualized as an integrated organizational capability rather than a mere management practice, requiring deliberate architectural support across three interdependent dimensions: formal structure, technological infrastructure, and standardized processes. This positioning aligns with the

view that effective governance is embedded in the firm's recurring organizational routines and supporting artifacts, such as the strategic portfolio backlog, which serve to bridge the gap between enterprise vision and distributed execution.

IEEE-03 (Bechtel et al., 2022) introduces a perspective that partially bridges the gap between the academic and practitioner framings: "project teams are not only agents of the project portfolio but make decisive contributions to the portfolio management process." This is a claim about the distributed nature of governance that the PMO or portfolio board is not the only site of portfolio management practice, and that the teams executing projects are themselves participants in the governance system through their reporting, estimation, and escalation behaviours. The absence of GL evidence in this theme does not mean practitioners are indifferent to governance structures. EBSCO-RQ1-7 (Alves Teixeira & Drebes Pedron, 2023) adds a gap observation worth attending to: PMOs need purpose-built artefacts spanning multiple delivery methodologies, and current commercial PPM tools do not consistently meet this need.

IEEE-47 (Svejvig et al., 2025) establishes that the level of formalisation of project and portfolio management practices affects project performance, and that agile PPM methods are positively related to efficiency and stakeholder satisfaction. EBSCO-5 (Müller et al., 2025) identifies formal agile control mechanisms and systematic structures through which strategic actors direct attention and motivate behaviour at the portfolio level as foundational prerequisites for effective PPM governance.

4.3.6 RQ1 Summary: Key Findings

The five merged themes in RQ1 indicate a multi-layered case for why large-scale Agile organisations adopt portfolio management. Together they describe APM as a response to a structural problem: the gap between the strategic layer, where organisations decide what to invest in, and the delivery layer, where those investments are executed. Without portfolio management, this gap tends to widen. With it, the organisation gains governance mechanisms for keeping strategy and execution in continuous alignment.

MT1.1 (n=116) indicates that APM is used to translate strategy into resource allocation decisions. MT1.2 (n=91) adds that this alignment demands continuous empirical governance rather than static annual planning. MT1.3 (n=64) extends this to capacity that organisations may need to govern flow actively to prevent portfolio overload. MT1.4 (n=61) grounds these structural mechanisms in collaborative and behavioural enablers. MT1.5 (n=37) completes the picture with the PMO

infrastructure that gives APM institutional standing, though its absence from grey literature suggests this remains primarily an academic concern.

Across the five themes, a consistent pattern emerges: the evidence base for the APM rationale is stronger on structural and theoretical justifications than on empirical outcome evidence. Both the academic and practitioner literatures argue that portfolio governance is necessary, but neither provides extensive comparative evidence of governance outcomes in organisations with versus without effective APM. This gap in the evidence base is among the most significant findings in RQ1.

4.4 RQ2: What challenges do large-scale organisations face in the absence of APM?

Research Question 2 generated an evidence base of 128 discrete coded extracts (WL n=58; GL n=70). The synthesis reveals that academic and practitioner perspectives converge on the same governance failure modes, though they approach them from different angles. The white literature primarily explains the structural dynamics and theoretical foundations of organisational inertia and the "resource allocation syndrome," while the practitioner-led grey literature offers a detailed account of the "actuality" of these pathologies and the lived experience of navigating them. This intersection of evidence resulted in two merged themes (MT2.1 and MT2.2), which detail the compounding nature of governance failure.

Unlike RQ1, where the academic literature dominates certain themes and the grey literature dominates others, the RQ2 coding shows both literatures engaging with the failure mode question at roughly comparable rates.

It is also worth noting that RQ2 is framed around the problems that organizations face in absence of portfolio management, which means the evidence base necessarily describes failure states rather than success states. This framing creates an inherent bias toward negative findings in the coding which means sources are more likely to appear in RQ2 coding when they describe what goes wrong than when they describe what goes right.

One proximate cause that appears prominently across multiple RQ2 sources is the failure of information systems to provide governance bodies with the data they need for good portfolio decisions. Designing governance systems that surface the right information in the right form at the right time is itself a governance design problem, and it connects MT2.1 and MT2.2 directly to the RQ4 themes on measurement and value tracking.

Table 4-2

Consolidated Thematic Analysis for RQ2: Cost of the Absence of Agile Portfolio Management (n=128 extracts for this theme)

Merged Theme	WL themes and representative initial codes	GL themes and representative initial codes	Rationale for Inclusion (Merged Theme)	WL	GL	Total
MT2.1 Governance Breakdown, Strategic Drift & Value Leakage	<ul style="list-style-type: none"> • WL Theme 33: Value Leakage & Decision Failure (n=12) Failed Strategy execution; Less Return on Investment; Ineffective Decision making; Project failures and poor profitability; Lack of Project Prioritization; Lack of value realization 	<ul style="list-style-type: none"> • GL Theme 1: From Predictive to Empirical Steering (n=21) Deferred Value Realization; Annual planning creates strategy-execution gap; Annual cycle becomes idea "sinkhole"; Downward spiral of planning delays; Value-Driven Risk Mitigation; Lack of Value Analysis • GL Theme 3: Strategic Resilience & Stewardship (n=8) Stale projects lose business relevance; Stale ideas due to annual planning cycle; The Transparency Deficit; Value Demonstration Gap; Consumption Transparency; Opportunity loss due to long Planning cycles • GL Theme 7: Algorithmic Governance (n=2) Precision Gap; Gaming the System 	The single WL theme is the only source explicitly documenting governance breakdown as an outcome; the three GL themes confirm this through absence logic, showing that missing empirical steering, strategic stewardship, and data-driven prioritization are proximate causes of the same drift and value leakage.	12	31	43
MT2.2 Structural Fragmentation and	<ul style="list-style-type: none"> • WL Theme 3: Capacity-Constrained Delivery Pressure (n=2) 	<ul style="list-style-type: none"> • GL Theme 2: Operationalizing Flow & Capacity (n=16) Conflicting resource demands; Resource allocation unrest; 	The largest merged theme in RQ2, combining eleven WL sub-themes that document distinct sources	46	39	85

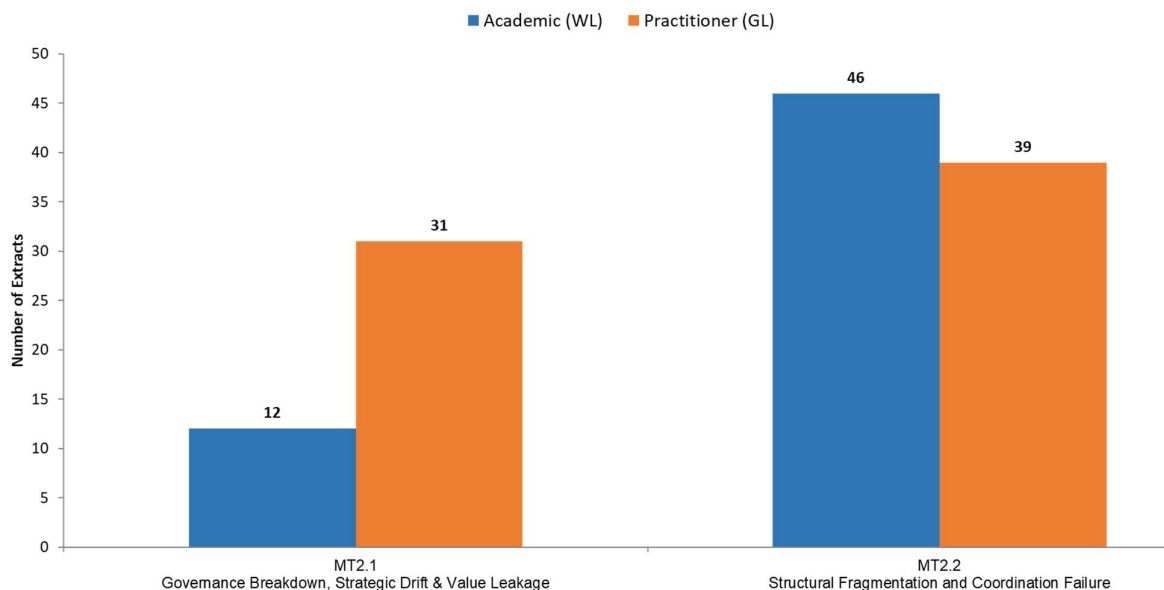
Coordination Failure	<p>Resource overload; Ineffective resource management without PPM</p> <ul style="list-style-type: none"> • WL Theme 4: Cross-level collaboration patterns (n=1) Inefficient stakeholder communication • WL Theme 7: Decentralized execution patterns (n=1) Agile team interdependency management • WL Theme 10: Institutional Process Incompatibility (n=6) Inappropriate PPM Methodologies; KPI gaps in budget, timing and resources; Traditional portfolio KPI failures; Unsuitable budget-planning KPIs; Unsuitable schedule-control KPIs; Drill-down KPIs partially usable • WL Theme 11: Methodological Fragmentation & Silos (n=8) Strategic Misalignment; Organizational Silos; Disjoined Governance; PPM implementation falling short of design 	<p>Capacity and budget competition; Massive efficiency loss from poor strategic-portfolio linkage; The Kitchen-Sink Effect (Bloated Backlogs)</p> <ul style="list-style-type: none"> • GL Theme 4: behavioral & Institutional Anchors (n=18) Invisible projects and hidden demand; Lack of global view of resources; Missing portfolio management in initial implementation; Budget protection over value-based prioritization; Alignment around value vs micro-management; High-bandwidth communication degrades • GL Theme 5: The Financial Translation Layer (n=1) Traditional budgeting and planning roadblocks • GL Theme 8: Relentless Operational Excellence (n=2) Inwardly Focused Investment; Reducing waste and non-value work • GL Theme 10: Empirical Learning Culture (n=2) Activity Measures Trap; Evolving maturity with adaptive governance 	<p>of coordination failure (methodological plurality, resource instability, complexity, capability gaps, process incompatibility, communication breakdown) with five GL sub-themes that confirm each mechanism through practitioner accounts of the same fragmentation.</p>
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- WL Theme 12:
Organizational learning
enablement. (n=1)
Lack of knowledge sharing
 - WL Theme 13: Perceived
implementation barriers (n=3)
 - Cross-level sequencing and
tracking difficulty; Task
sequencing constraints; Cost
and efficiency concerns with
agilityWL Theme 15: Portfolio
complexity management
(n=7)
Maintaining Heterogeneous
IT projects; Monitoring
interdependent initiatives;
Interconnectivity and
complexity;
Interdependencies among
projects; Lack of team
coordination; Ineffective team
coordination
 - WL Theme 17: Portfolio
management capability gap
(n=3)
Limited Research on PPM;
Ineffective management of
multiple projects; Perceived
limited applicability
 - WL Theme 18: Systemic
Risk & Technical Debt
Accumulation (n=3)
-

-
- Aggregate risk of failure;
Technical Debt
Accumulation; Short-Term
Efficiency Orientation
 - WL Theme 26: Reactive
Resource Instability (n=11)
Resource allocation unrest;
Lack of global view of
resources; Resource
misalignment; Excessive
Multitasking; Impact of
firefighting
-

Note. Theme numbers are labels only from the consolidation step and do not indicate rank (see Section 3.7.3).

Figure 4-3
RQ2 Extract Counts by Merged Theme (Academic vs Practitioner)



4.4.1 MT2.1: Strategic Drift and Value Leakage (n = 43)

When organisations lack a mechanism for continuously connecting strategy to investment decisions, strategies do not simply go unrealised but they actively erode. MT2.1 examines this erosion process: how small, individually justifiable decisions accumulate into large strategic misalignments, how the quality of decisions degrades when governance is absent, and how value that capable teams could have delivered simply leaks away through misdirected effort.

MT2.1 draws on Theme 33 (Value Leakage & Decision Failure), which directly captures the governance breakdown and strategic drift dynamics that characterise portfolio management failure. The grey literature evidence comes from Theme 1 (From Predictive Control to Empirical Steering) and Theme 3 (Strategic Resilience & Stewardship), which describe from the practitioner perspective what happens to organisational direction and value delivery when empirical steering and strategic stewardship mechanisms are absent.

In this theme, the 43 extracts came from 14 sources (6 WL, 8 GL); no source supplies more than 21%. The white literature documents governance breakdown as an outcome, and the grey literature points to missing empirical steering, strategic stewardship and data-driven prioritisation as proximate causes of the same drift.

When portfolio governance is absent, the gap between what an organisation intends to deliver and what it actually delivers widens progressively. Left unaddressed, the gap becomes structural rather than circumstantial. EBSCO-8 (Harake, 2025) cites a statistic that reframes the whole conversation: nearly 90% of corporate strategies fail to be implemented effectively, not because they are inherently flawed, but because they falter in execution (Cabanis-Brewin, 2000, as cited in Harake, 2025).. In many cases, this failure stems from the disconnection between strategic intent and the project-based mechanisms intended to carry that intent forward with the root cause being the disconnection between strategic decisions and project investment decisions. If there is no portfolio governance mechanism mediating between strategy and project selection, misalignment is the default outcome rather than the exception.

It was identified in EBSCO-8 (Harake, 2025) that the mechanism of failure directly: "the failure to translate business models into actionable, well-governed project structures undermines not only return on investment but also long-term strategic resilience." Scopus-42 (Vähäniitty et al., 2010) categorises the resulting decision-making failures as "late, toothless, or misguided and/or uninformed portfolio-level decision making". It is a taxonomy that captures the three main failure modes that are decisions that come too late to matter, decisions that lack the authority to change anything, and decisions made without adequate information.

Poor governance at portfolio level does not merely fail to add value; it subtracts value that team-level Agile would otherwise have produced. Scopus-60 (Dingsøyr et al., 2018) and Scopus-128 both identify slow and ineffective portfolio-level decision-making as a core consequence of absent portfolio governance, with portfolio decisions characterised as late, lacking authority, or inadequately informed.

The GL evidence is often more direct than the academic evidence, but EBSCO-19 (Rosenberger & Struzl, 2017) contributes a measurement dimension. Classic budget-to-plan, schedule variance, and resource utilisation metrics are "structurally unsuited to agile portfolios," creating a kind of measurement blindness that prevents governance from functioning even when the structural intent is sound. An organisation can hold all the right governance meetings and have none of the right information.

GL-3-27 (*Portfolio Management Mindset*, n.d.) adds a particularly useful framing for RQ2. "Strategic drift is not a single event but a slow accumulation of small misalignments that no single project decision is large enough to fix." That observation matters because it explains why governance breakdown is so hard to detect at the time it is happening. Each individual misallocation is small

enough to be defensible; only the aggregate is catastrophic. Without portfolio governance, there is no aggregate view, and therefore no point at which the cumulative drift becomes visible to decision-makers.

4.4.2 MT2.2: Structural Fragmentation and Coordination Failure (n = 85)

Where MT2.1 examines what happens to an organisation's direction in the absence of portfolio governance, MT2.2 examines what happens to its internal structure. Large organisations without portfolio management do not simply fail to coordinate, they fragment. Teams, departments, and portfolios begin operating as independent silos, each optimising locally while the aggregate performance of the organisation deteriorates. MT2.2 maps the specific structural failure modes for example the broken handoffs, the invisible bottlenecks, the resource conflicts that accumulate when no one has authority or visibility across the full portfolio.

MT2.2 draws on a broad set of white literature themes that together describe structural and resource-level fragmentation in the absence of portfolio governance. Theme 11 (Methodological Fragmentation & Silos) and Theme 26 (Reactive Resource Instability) contribute the largest evidence bases, joined by Themes 3 (Capacity-Constrained Delivery Pressure), 4 (Cross-level collaboration patterns), 7 (Decentralised execution patterns), 10 (Institutional Process Incompatibility), 12 (Organizational learning enablement), 13 (Perceived implementation barriers), 15 (Portfolio complexity management), 17 (Portfolio management capability gap), and 18 (Systemic Risk & Technical Debt Accumulation), which collectively address capacity pressures, coordination deficits, process incompatibilities, and systemic risk accumulation. The grey literature contribution draws from Theme 2 (Operationalizing Flow & Capacity), Theme 4 (Behavioural & Institutional Anchors), Theme 5 (The Financial Translation Layer), Theme 8 (Relentless Operational Excellence), and Theme 10 (Empirical Learning Culture), providing the practitioner lens on how fragmentation manifests across flow, coordination, and financial governance.

The 85 extracts in this merged theme came from 23 sources (14 WL, 9 GL); no source supplies more than 18%. The white literature documents separate sources of coordination failure (methodological plurality, resource instability, complexity, capability gaps, process incompatibility and communication breakdown), and the grey literature describes the same fragmentation in practice.

This is the largest RQ2 theme by extract count (n = 85), and its WL and GL contributions are the more balanced of the two RQ2 themes. Without portfolio governance, large-scale Agile

organisations fragment into methodological silos, competing for resource pools, with coordination mechanisms that break down as scale increases.

The academic literature frames structural fragmentation primarily as an organisational design problem. EBSCO-8 (Harake, 2025) captures vertical fragmentation saying that "In many organisations, strategy formulation and project execution are handled by different groups with limited interaction. This can result in misaligned priorities for example, a strategy team might envision a bold new digital business model, but individual projects within departments continue to pursue incremental improvements to existing systems.". Scopus-164 (Stettina & Hörz, 2015) identifies a horizontal fragmentation problem as well: "having more than one portfolio might lead to an untransparent allocation of resources across the projects.". Scopus-164 (Stettina & Hörz, 2015) also identify a specific trigger: "frequent switching between projects creates unrest. From a lean perspective this is waste," with "untransparent allocation of resources" as the structural consequence of absent portfolio visibility. Academic literatures are direct about what this looks like in practice. "Firefighting refers to the reactive and unplanned allocation of resources to solve and fix problems discovered late in a project," with reactive redistribution producing "unanticipated negative effects on other projects in the portfolio." Solving a crisis in one project by reallocating resources creates a crisis elsewhere. Without a portfolio-level mechanism to absorb and manage these ripple effects, the organisation oscillates between firefighting and overcommitment.

IEEE-13 (Vazifeh-Noshafagh et al., 2022) extends the analysis to multi-Scrum contexts, identifying "cross-level sequencing and tracking difficulty" and "agile team interdependency management" as specific coordination failures when multiple Scrum teams lack portfolio-level dependency governance.

EBSCO-19 (Rosenberger & Struzl, 2017) identifies a further aspect, a measurement gap that makes fragmentation harder to address: "the biggest gaps are with KPIs concerning budget, timings, and resources. When using agile approaches, some of the most important KPIs cannot be reported as easily as in a classic approach."

The grey literature in these themes provided more vivid descriptions of the finding. GL-3-26 (*Lean Portfolio Management-Maximizing Value Across Many Programs*, n.d.) introduces a catalogue of fragmentation symptoms that reads like a diagnostic checklist: "the kitchen-sink effect" (backlogs bloated with low-priority work), "the watermelon project syndrome" (projects that appear green from the outside but are red on the inside), "the multi-project distraction trap" (people formally assigned

to too many initiatives to be effective on any of them), and "the 18-month innovation lag" (the time between a new product idea and its first delivery, during which competitors can move ahead). These are not theoretical constructs but they are names practitioners have given to recurring failure patterns they encounter in their consulting and transformation work. GL-3-49 (*Strategic Planning and Lean Portfolio Management*, n.d.) adds "capacity and budget competition" as a structural driver of fragmentation, noting the tendency toward "budget protection over value-based prioritisation" which aligns with the idea that project teams are fighting for resources based on political capital rather than strategic merit.

GL-1-17 (*Accelerating Strategy Execution: Effective Portfolio, Program and Project Management*, n.d.) frames the coordination failure dimension through the concept of "siloe structures preventing cross-functional collaboration" and a "PMO underutilised as strategic partner." Both of these are institutional failures rather than project failures and they describe an organisation in which the governance infrastructure exists but is not operating as intended. The PMO is present as an administrative rather than strategic pillar. The cross-functional structures exist on paper but fragment under delivery pressure. GL-5-06 (*Value-Driven Digital Business*, n.d.) identifies a related failure: "inwardly focused investment," where the portfolio is governed by internal efficiency metrics rather than external value creation metrics, leading to an organisation that optimises its own operations while drifting away from customer and market relevance.

GL-3-33 (*Innovation, Portfolio Management, and Agility as a Happy Family*, n.d.) contributes an observation that. "The barrier to effective priority setting is not process. It is dysfunctional politics and lack of trust." That observation locates the root cause of structural fragmentation is not in governance design failures but is in the absence of the relational conditions that governance depends on to function.

4.4.3 RQ2 Summary: Key Findings

The two RQ2 themes describe portfolio management failure from two distinct angles that are, on closer examination, mutually reinforcing. MT2.1 (n=43) documents failures at the strategic level: governance drift, value leakage, and the continuation paradox through which organisations continue investing in projects whose strategic rationale has expired. MT2.2 (n=85) documents failures at the operational level: structural fragmentation, resource instability, and the information asymmetries that prevent governance bodies from seeing the true state of the portfolio. The central analytical finding from RQ2 is not that portfolio management failure is dramatic, but that it is typically invisible.

The problem is not a lack of knowledge about the failure modes. It is the barriers that prevent organisations from implementing the governance structures that would address them.

4.5 RQ3: What are the barriers that stop organisations from implementing PPM?

Research Question 3 (RQ3) transitions the analytical focus from the diagnosis of organizational failure modes toward an examination of the systemic adoption barriers that impede the institutionalization of Agile Portfolio Management (APM) in large scale organizations, even when the operational need is acknowledged. The synthesis of 119 coded extracts identifies three primary merged themes that characterize these impediments: Socio-Political and Cultural Resistance (MT3.1); Structural Complexity and Scalability Barriers (MT3.2); and Capability Deficits and Resource Constraints (MT3.3). These barriers are not independent. Each category interacts with and compounds the others. For instance, "institutional inertia" and power-preserving behaviours among senior stakeholders (MT3.1) frequently exacerbate the "ambidexterity tension" inherent in trying to manage stability alongside fluid execution (MT3.2). Simultaneously, "financial governance rigidity" such as a continued reliance on annual budgeting cycles (MT3.3) prevents the resource mobilization required to resolve structural and scalability constraints.

These findings illustrate an "Adoption Paradox" where the environmental conditions that make APM most necessary such as intense resource competition and politically distorted prioritization are the precise conditions that make it most difficult to adopt. RQ3 therefore suggests that APM adoption is an organisational transformation and not only a design exercise, and that it may need to address power dynamics and structural rigidities early.

Table 4-3*Consolidated Thematic Analysis for RQ3: Barriers to Adopting Agile Portfolio Management (n=119 coded extracts for this theme)*

Merged Theme	WL themes and representative initial codes	GL themes and representative initial codes	Rationale for Inclusion (Merged Theme)	WL	GL	Total
MT3.1 Socio-Political and Cultural Resistance	<ul style="list-style-type: none"> • WL Theme 9: Executive resistance to change (n=3) Lacking Senior management commitment; Fear of Loss of control; Resistance to change • WL Theme 14: Socio-Political & Cultural Resistance (n=7) Political Pressure; Opportunist Stakeholder Behavior; Organizational and Political realities; Entrepreneurial Organizational Culture; Resistance to Portfolio Standards; Stakeholder resistance • WL Theme 15: Portfolio complexity management (n =1) Maintaining Heterogeneous IT projects; Monitoring interdependent initiatives; Higher Complexity; Interconnectivity and complexity 	<ul style="list-style-type: none"> • GL Theme 4: & Institutional Anchors (n=37) Organizational Culture Resistance to Change; Management Buy-In as Critical Barrier; Change management for portfolio transformation; IT as a cost commodity; Governance as culture shift; Misalignment with existing processes ... 	WL themes distinguish broad cultural resistance from the specific leadership dimension of executive resistance, with complexity shown to amplify both; the GL theme confirms institutional and behavioral inertia as the dominant barrier practitioners actually encounter.	11	37	48
MT3.2 Structural Complexity and Scalability Barriers	<ul style="list-style-type: none"> • WL Theme 10: Institutional Process Incompatibility (n=5) Alignment with existing processes; Annual Budgeting cycle; Maturity-assessment 	<ul style="list-style-type: none"> • GL Theme 1: Empirical Steering (n=5) Cost-Centric vs Speed-Centric Bias; Planning for the Ghost of the Future; 	WL themes establish structural complexity as a barrier from multiple angles (the exploration/exploitation paradox, portfolio	28	15	43

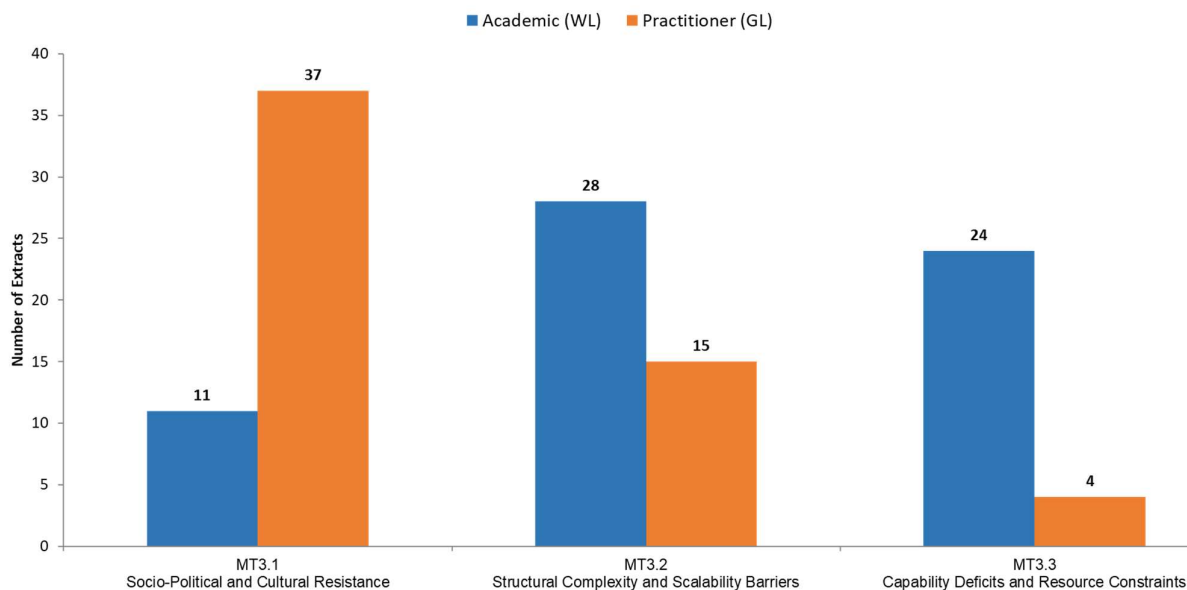
<p>artifacts for PPM; Risk of management not supporting agile</p> <ul style="list-style-type: none"> • WL Theme 11: Methodological Fragmentation & Silos (n=6) Portfolio Unbalancing and overcrowding; Disjoined Governance; Complexity of Agile–strategy integration; Structural rigidity during Agile transformation; Intangible nature of software inventory; Delivery-and-sustainability-metrics gap • WL Theme 15: Portfolio complexity management (n=8) Complexities of Agile PPM; Interconnectivity and complexity; Missing architectural decision tooling; Distributed development challenges; Complexity from project interdependencies • WL Theme 23: Portfolio-Level Agility & Value (n=1) Agile methods as inherently ambidextrous • WL Theme 29: Strategic ambidexterity tension (n=6) Organizational misalignment; Ambidexterity challenge; Tension between agility and stability; Paradoxical tension in Agile 	<p>Impact of legacy processes; The Political-Analytical Balance; The Dysfunctional Politics Barrier</p> <ul style="list-style-type: none"> • GL Theme 2: Operationalizing Flow & Capacity (n=3) Missing effective ecosystem management; Lack of Minimum Business Increment concept in frameworks; Lack of agility • GL Theme 3: Strategic Resilience & Stewardship (n=4) Lack of market information; Dynamic Portfolio Requires Elevated Governance Effort; Risk Complexity Increases with Portfolio Dynamism; Growing Complexity of Interdependencies and Innovation Cycles • GL Theme 9: Paradox Management (n=3) Fuzzy Numbers Lead to Fuzzy Action; Manipulation by Leaders; Governance as a roadblock to agility 	<p>interdependency, methodological plurality, and the mismatch between small-team frameworks and large-scale needs); GL themes confirm each barrier operationally and frame it through practitioners' paradox-management vocabulary.</p>
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	<p>transformation; Failure to balance exploration and exploitation; Misunderstanding of Agile as destabilizing</p> <ul style="list-style-type: none">• WL Theme 31: Structural scalability barriers (n=2) Co-location constraint; Agile methods designed for small team•					
MT3.3 Capability Deficits and Resource Constraints	<ul style="list-style-type: none">• WL Theme 3: Capacity-Constrained Delivery Pressure (n=3) High Workload Pressure; Time Pressure / Tight Deadlines; Expert resource scarcity• WL Theme 6: Customer-centric value delivery (n=3) Continuous Customer Feedback; Low customer involvement; Fragment customer understanding• WL Theme 12: Organizational learning enablement (n=1) Dependence on stakeholder communication capability• WL Theme 13: Perceived implementation barriers (n =4) Implementation cost; Project data quality; Need to adapt portfolio processes for agile; Traditional control focus on restricting behavior;	<ul style="list-style-type: none">• GL Theme 5: The Financial Translation Layer (n=2) Lack of IT costing knowledge; Stakeholder-Centric Presentation• GL Theme 8: Relentless Operational Excellence (n=9 not stated*) Inwardly Focused IT; Activity over value creation measures	WL themes document capability and resource barriers from complementary angles (technical debt, competence gaps, implementation cost, role disruption, learning-enablement absence); GL themes confirm the financial-governance dimension and show how, without continuous-improvement capability, these deficits become self-perpetuating.	24	4	28

-
- WL Theme 17: Portfolio management capability gap (n=5)
Ineffective management of multiple projects; Perceived limited applicability; Portfolio contingencies shape agile practice; Tailored agile methodology mix; Need for clear role distinction
 - WL Theme 18: Systemic Risk & Technical Debt Accumulation (n=5)
Technical Debt Accumulation; Short-Term Efficiency Orientation; Workarounds and Quick-and-Dirty Practices; Legacy Architecture Degradation; Operational Disruption
 - WL Theme 26: Reactive Resource Instability (n=1)
Resource allocation unrest; Excessive Multitasking; Lack of global view of resources
 - WL Theme 36: Role & identity disruption (n=2)
Uncertainty about new job roles; Role ambiguity as implementation barrier
-

Note. Theme numbers are labels only from the consolidation step and do not indicate rank (see Section 3.7.3).

Figure 4-4
RQ3 Extract Counts by Merged Theme (Academic vs Practitioner)



4.5.1 MT3.1: Socio-Political and Cultural Resistance (n = 48)

MT3.1 synthesises Theme 14 (Socio-Political & Cultural Resistance), Theme 9 (Executive resistance to change), which together address the human and political dimensions of APM adoption barriers, alongside Theme 15 (Portfolio complexity management), which establishes that portfolio complexity creates conditions that sustain and amplify political resistance when governance is complex and opaque, political actors can exploit that opacity to resist change without facing accountability. The grey literature evidence comes from Theme 4 (Behavioural & Institutional Anchors), which provides the practitioner depth on why cultural resistance is the most frequently encountered barrier in practice.

The 48 extracts come from 16 sources (5 WL, 11 GL) where no data sources have provided more than 23%. The white literature separates broad cultural resistance from executive resistance, and the grey literature identifies institutional and behavioural inertia as the barrier met most often.

SCOPUS-RQ2-13(Hoffmann et al., 2020) argue that the "actuality" of portfolio management is frequently distorted by political realities, goal conflicts, and opportunistic stakeholder behaviours that undermine formal governance structures. Scopus-164 (Stettina & Hörz, 2015) notes "the lacking commitment and involvement of senior management to the software development process," and observes that "higher management is used to being in control of projects and now have to trust the Agile teams that work gets done."

SCOPUS-RQ1-24(Dias & Tenera, 2023) provides the academic framing: "changing people's mindsets and cultures is known as one of the most challenging aspects of agile transformations, as it is an endeavour that can only be accomplished in a top-down and bottom-up effort to reach all levels of the organisation." SCOPUS-RQ2-13 (Hoffmann et al., 2020) adds the political dimension to this theme that "the dynamics of organisational and political realities, such as goal conflicts and stakeholders' opportunistic or shirking behaviours, represent major challenges for IT PPM."

Practitioner-led evidence provides a more granular account of the emotional and cultural foundations of this resistance, identifying a pervasive "fear of losing control" among managers accustomed to rigid hierarchies and upfront planning. A specific failure mode appears in large-scale implementations: the "bureaucratic simulation" of agility. In this scenario, organizations adopt frameworks like SAFe as a compliance exercise, utilizing agile vocabulary to mask a traditional waterfall reality, which effectively prevents the exploration of genuinely adaptive practices. GL-3-06 (*SAFe: The Good, the Bad, and the Ugly*, n.d.) makes an observation about a specific failure mode which is to say, organisations that adopt a scaling framework as a compliance exercise, rather than a genuine transformation, often create a bureaucratic simulation of Agile that preserves traditional power structures while using Agile vocabulary.

Practitioner led literature identify the change management dimension as a specific governance gap: "change management not integrated into portfolio processes" and "management buy-in as critical barrier."

4.5.2 MT3.2: Structural Complexity and Scalability Barriers (n = 43)

The contributing themes for this merged theme address structural and architectural barriers describing the difficulty of scaling Agile governance, managing ambidexterity between exploratory and exploitative portfolios, and adapting methodologies across hybrid environments. MT3.2 draws on six white literature themes that together address the structural and architectural barriers to APM adoption namely Theme 29 (Strategic ambidexterity tension), the most theoretically distinctive contributor, which frames the challenge of governing exploitation and exploration simultaneously; Theme 15 (Portfolio complexity management); Theme 11 (Methodological Fragmentation & Silos); Theme 31 (Structural scalability barriers); Theme 23 (Portfolio-Level Agility & Value), which establishes that the pursuit of portfolio-level agility itself generates structural tensions as organisations must simultaneously dismantle legacy governance structures while building replacement mechanisms; and Theme 10 (Institutional Process Incompatibility). The grey literature contribution comes from Theme 1 (From Predictive Control to Empirical Steering), Theme 2

(Operationalizing Flow & Capacity), Theme 3 (Strategic Resilience & Stewardship), and Theme 9 (Paradox Management), the last of which adds the practitioner framing of structural tensions as enduring paradoxes to be managed rather than problems to be solved.

For this merge theme, the 43 extracts come from 21 sources (12 WL, 9 GL) and no literature has supplied more than 17%. The white literature presents structural complexity as a barrier from several angles, including the exploration-exploitation paradox, interdependency and methodological plurality, and the grey literature confirms each in operational terms.

MT3.2 addresses the structural and architectural barriers to APM adoption. It explains the barriers that persist even after cultural resistance has been overcome. These are the barriers embedded in how organisations are designed: their scale, their methodological pluralism, their inherited processes, and the fundamental tension between agility and organisational stability. The GL themes contribute through a diagnostic logic: each describes a capability that, when absent or misapplied, produces the barriers identified by the WL.

SCOPUS-RQ2-13 (Hoffmann et al., 2020) identifies the planning architecture problem: "IT PPM is often based on annual budget planning and is not designed to execute beneficial projects swiftly or to adaptively refine the portfolio structure without negative side-effects." This is a structural mismatch where the financial governance systems of most large organisations were designed for predictive, plan-driven project portfolios, and they do not flex easily to accommodate rolling-wave planning, iterative funding, or mid-cycle portfolio reconfiguration. SCOPUS-RQ2-13 (Hoffmann et al., 2020) also identifies the ambidexterity challenge: "organisations face challenges when seeking to reconcile a consistent organisational alignment with the deliberate engagement in experimental activities to explore emerging opportunities." This is the strategic ambidexterity problem with the tension between exploitation (delivering on existing commitments) and exploration (investing in new and uncertain opportunities).

At the enterprise scale, structural complexity grows non-linearly as the number of interdependencies between teams, programs, and products multiplies. This multi-level governance complexity intensifies the tension within the team relationship, where the coordination overhead required to manage distributed autonomous teams can potentially exceed the capacity freed up by the agility efforts. Consequently, the lack of centralized interdependency orchestration often results in "structural fragmentation" and the emergence of methodological silos. Scopus-37 (Sweetman et al., 2014) mentioned the structural complexity of multi-level governance: "PPM involves the control of multiple projects and therefore multiple controllers by one controller, which brings its own distinct set

of challenges for organisations and potentially increases the complexity of the controller-controlee relationship and the interactions between them."

Practitioner-led evidence adds a granular methodological dimension, identifying the phenomenon of "planning for the ghost of the future," as highlighted in GL-3-26 (*Lean Portfolio Management-Maximizing Value Across Many Programs*, n.d.) where organizations continue to govern portfolios based on outdated projections rather than emergent market actualities. This is exacerbated by a specific gap in many scaling frameworks which is the lack of a minimum business increment concept, which prevents the decomposition of large strategic initiatives into independently fundable and deliverable units. L-3-49 (*Strategic Planning and Lean Portfolio Management*, n.d.) argues that many scaling frameworks do not provide clear guidance on how to decompose strategic initiatives into independently deliverable and fundable units, which makes iterative portfolio governance difficult to implement in practice.

4.5.3 MT3.3: Capability Deficits and Resource Constraints (n = 28)

MT3.3 draws on eight white literature themes addressing different facets of capability and resource deficits: Theme 18 (Systemic Risk & Technical Debt Accumulation) and Theme 17 (Portfolio management capability gap) are the primary contributors, joined by Theme 13 (Perceived implementation barriers), Theme 36 (Role & identity disruption), Theme 6 (Customer-centric value delivery), Theme 12 (Organizational learning enablement), Theme 26 (Reactive Resource Instability), and Theme 3 (Capacity-Constrained Delivery Pressure). The grey literature evidence comes from Theme 5 (The Financial Translation Layer) and Theme 8 (Relentless Operational Excellence), providing the practitioner perspective on why financial governance gaps and operational capability deficits prevent APM adoption even where leadership support exists.

The 28 extracts for this theme were contributed from 14 literature sources (11 WL, 3 GL); SCOPUS-RQ2-13 supplies 8 of them. The white literature documents capability and resource barriers (technical debt, competence gaps, implementation cost and role disruption), and the grey literature adds a financial-governance dimension.

A primary structural constraint is financial governance rigidity. SCOPUS-RQ2-13 (Hoffmann et al., 2020) identify that IT PPM is frequently anchored to annual budget planning cycles that are structurally unsuited to executing projects swiftly or adaptively refining the portfolio without incurring significant "negative side-effects". This financial "rigidity trap" is often compounded by technical debt accumulation, which is conceptualized not as individual incompetence but as a rationalized response

to chronic overcommitment and high workload pressure. Under these tight deadlines, employees often resort to "quick-and-dirty" implementation patterns that generate "architecture debt," SCOPUS-RQ2-13 (Hoffmann et al., 2020) captures the capability gap in the delivery context as "owing to high workloads, tight deadlines, and high custom software development, employees tended to carry out activities in 'quick and dirty' ways, with easily achievable results, but with flaws or unwanted side-effects in legacy architectures." Scopus-164 (Stettina & Hörz, 2015) identifies the role disruption dimension: "uncertainty about possible shifts in organisational roles, especially among managers as agile teams take over certain aspects of traditional project management such as planning and coordination." This uncertainty is a capability problem as well as a cultural one. EBSCO-RQ1-2(Ershadi et al., 2020) confirms role ambiguity as a systemic implementation barrier, noting that "the implementation of a PPM system has its challenges, such as the ambiguity of roles, and the validity of performance information for decision-making purposes," and that "a holistic overview of the systems, organizational structure and processes of the organization is needed for the proper implementation of a PPM system."

EBSCO-5 (Müller et al., 2025) identifies a measurement gap by mentioning that "the literature tends to neglect the agile character of the levers of control due to measurement instruments focusing on restricting undesirable behaviours and internal issues, such as deviations from pre-set plans and requirements." This is arguing that the control systems used in traditional PPM are oriented toward compliance and variance detection rather than learning and adaptation. IEEE-03 (Bechtel et al., 2022) situates this within portfolio management practice, noting that "portfolio managers need to be aware of the differences between agile and traditional project management approaches" and that "the portfolio processes' characteristics constitute contingency factors for single projects." IEEE-13(Vazifteh-Noshafagh et al., 2022) identifies a practical capability requirement that follows: "the results obtained suggested employing more than one agile methodology instead of having a common one for managing all the projects of the portfolio," a level of methodological sophistication most organisations lack at the point of APM adoption. Scopus-7(Alves & Gonçalves, 2023) further identifies stakeholder communication as a foundational prerequisite, arguing that "the ability to adopt Agile is related to communication among stakeholders."

The adoption of APM is further inhibited by a significant measurement and data quality gap. EBSCO-RQ1-12 (Ajjan et al., 2013) argue that the perceived cost of implementation serves as a primary inhibitor, particularly when existing project data is not available, consistent, or up-to-date". Because APM routines such as capacity planning, throughput measurement, and value tracking completely rely on a reliable data foundation to function, organizations lacking this data find themselves unable

to operate new governance routines. Scopus-128 (Aghajani et al., 2023) identifies that the momentum of portfolio-level change generates resource conflicts, as "all projects compete for limited resources," a dynamic that constrains the capacity available for governance investment. Scopus-RQ1-33 adds a related constraint: "the progress of R&D projects has more and more begun to rely on the availability of individual experts who are generally scarce and expensive," meaning specialist scarcity creates a direct bottleneck on capability development.

GL-2-18 (Accelerating Business Value with SAFe® and Technology Business Management, 2020) adds a financial literacy dimension as "lack of IT costing knowledge". It is observed that many IT organisations do not have the financial skills to participate effectively in portfolio-level investment decisions. GL-5-20 (*Is Your Governance Fit for Purpose?*, n.d.) captures a related gap: "activity over value creation measures" as a governance system that measure what people are doing rather than what value they are creating, which makes it structurally impossible to have the kind of value-based portfolio conversations that APM requires. GL-5-06 (*Value-Driven Digital Business*, n.d.) identifies a related operational bias that reinforces this gap: "many organizations haven't understood the profound changes required to move from cost-based, inwardly focused IT to value-driven and externally focused," indicating that the conceptual reorientation required for APM represents an unresolved capability deficit in its own right.

4.5.4 RQ3 Summary: Key Findings

The three RQ3 themes indicate that APM adoption faces barriers at three distinct levels. MT3.1 (n=48) identifies cultural and leadership resistance, MT3.2 (n=43) identifies structural and architectural barriers that persist even in organisations where leadership is broadly aligned and MT3.3 (n=28) identifies the capability and knowledge gaps that make effective APM implementation difficult even when the political and structural obstacles have been cleared.

4.6 RQ4: What governance structures, roles and decision-making processes within APM support continuous strategic alignment?

Research Question 4 investigates the reconfigured governance structures, roles, and decision-making processes required to sustain continuous strategic alignment within large-scale Agile environments.

The synthesis of 307 coded extracts yielded six merged themes (MT4.1–MT4.6), as summarized in **Table 4-4**, which collectively describe a layered governance model. **Figure 4-6** shows how these

mechanisms relate to one another: no single process or role can hold alignment, efficiency, and agility in balance simultaneously.

Table 4-4*Consolidated Thematic Analysis for RQ4: Characteristics of Effective Agile Portfolio Management Governance (n=307 coded extracts)*

Merged Theme	WL themes and representative initial codes	GL themes and representative initial codes	Rationale for Inclusion (Merged Theme)	WL	GL	Total
MT4.1 Empirical Steering and Strategic Realignment	<ul style="list-style-type: none"> • WL Theme 1: Adaptive Portfolio Governance (n=20) • PMO for project prioritization; Market-based allocation mechanism; Governance-enabled resource allocation; Evidence-based decision-making routines; Iterative Planning cycles; Rigorous Project Termination. 	<ul style="list-style-type: none"> • GL Theme 1: From Predictive Control to Empirical Steering (n=83) Iterative feedback; Increased portfolio decision cadence; Rolling wave over annual planning; Dynamic reassessment of investments; Lean portfolio management; OKR comparison of strategic initiatives. • GL Theme 10: Empirical Learning Culture (n=7) Envision-Evolve approach; Steady Stream of Evidence; Innovation and Agility Integration; Working software as progress indicator; Governance shift from deliverables to value; Continuous revaluation of value. 	The WL theme provides the governance-design vocabulary for empirical steering (rolling-wave planning, dynamic investment criteria); the two GL themes supply detailed operational description and the learning-culture prerequisite that sustains empirical steering rather than reverting to predictive control.	20	90	110
MT4.2 Institutional Governance Architecture and PMO Design	<ul style="list-style-type: none"> • WL Theme 16: Portfolio governance structures (n=59) Portfolio vision by PMO; PMO as investment decision authority; PMO as 	<ul style="list-style-type: none"> • GL Theme 3: Strategic Resilience & Stewardship (n=25) Organizational Alignment for achieving Business Agility; PPM for strategic planning; 	WL themes describe formal PMO governance structures and the shift toward distributed accountability; the GL theme confirms and enriches this with practitioner-level detail on the	60	25	85

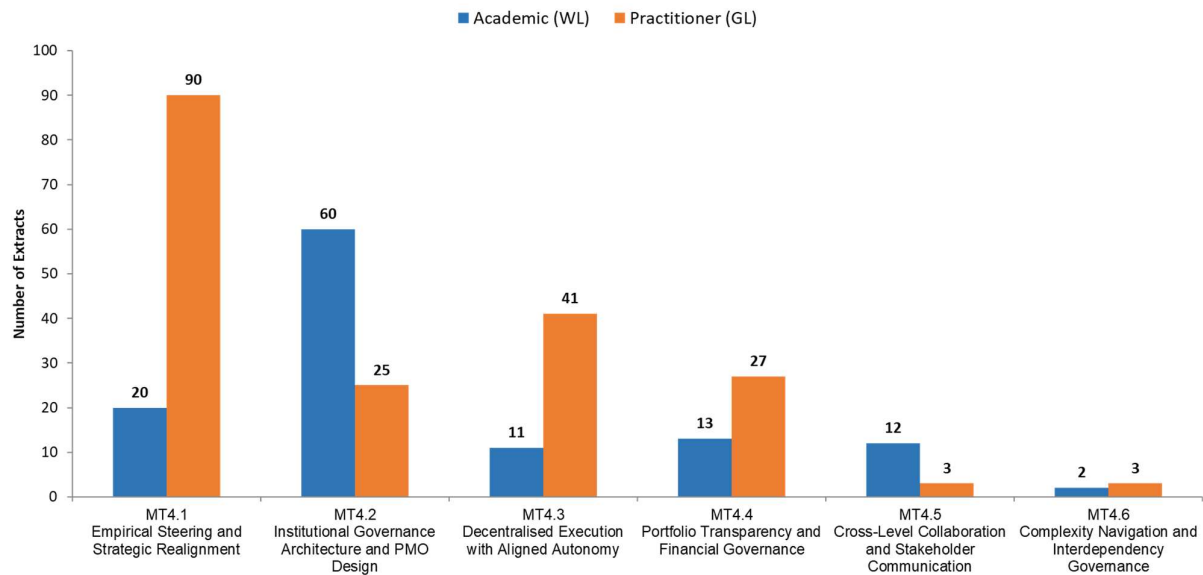
	Value-stream funding layer; Centralized portfolio accountability; Effective Data governance; Stakeholder involvement	Strategy-to-Solution Traceability; Prune initiatives that no longer align with strategy; Continuous work alignment with Organizational strategy; The Modernization Mandate.	governance bodies, roles, and strategic-alignment practices that realize it.			
MT4.3 Decentralized Execution with Aligned Autonomy	<ul style="list-style-type: none"> • WL Theme 38: Distributed governance & accountability (n=1) Shared ownership • WL Theme 7: execution patterns (n=6) Team Coordination; Empowering Agile Teams; Team Synchronization; OKRs Method for Team Autonomy; Agile team interdependency management; Continuous integration of portfolio components • WL Theme 23: Portfolio-Level Agility & Value (n=5) Project Value modularization; flexibility and quality as project success indicator; Increase time to market; Research Innovation; Portfolio agility 	<ul style="list-style-type: none"> • GL Theme 2: Operationalizing Flow & Capacity (n=31) Strategic product backlog; Early project decomposition; Value-Centric Granularity (MBI); Delivering important aspects first; Capacity-Constrained Flow GL Theme 4: Behavioural & Institutional Anchors (n=10) Single integrated portfolio; Decentralized Decision-Making; Portfolio Visibility & Value-Prioritization; Cross-Functional Breakdown based on Interdependencies; Unified Business Nomenclature; Visualizing the Finish Line ... 	WL themes supply the structural vocabulary for delegating execution authority and the value dimension empowered teams must preserve; GL themes confirm the operational infrastructure and cultural foundations of trust and transparency, without which decentralization produces fragmentation rather than aligned autonomy.	11	41	52

MT4.4 Portfolio Transparency and Financial Governance	<ul style="list-style-type: none"> • WL Theme 6: Customer-centric value delivery (n=2) Continuous Customer Feedback; Conflicting customer understanding • WL Theme 19: Portfolio risk (n=2) Uncertainty management by PMO; Agile guardrails for risk and opportunity • WL Theme 21: Portfolio transparency and visibility (n=9) Portfolio performance metrics; Portfolio-wide visibility of interdependencies; Portfolio-level traceability; Transparent goal setting; Real-time, action-oriented dashboards 	<ul style="list-style-type: none"> • GL Theme 5: The Financial Translation Layer (n=13) Cross functional communication; Business Translation Layer; The 'Bill of IT' Concept; Standard Taxonomy for Alignment; Solving the 'Tower of Babel' • GL Theme 6: Product-Centric Stewardship (n=7) Cross Functional Collaboration; Run vs. Change Rebalancing; Full Lifecycle Accountability; Stable Teams (ARTs) • GL Theme 7: Algorithmic Governance (n=7) The Four Dimensions of Transparency; Value Accounting; Fuzzy Measures of Important Things; Data Science for Value Metrics; Federated decision-making; Real-Time Portfolio Visibility Enabled by AI and Automation ... 	WL themes establish transparency as the information substrate for governance decisions, extended to risk data and customer-value tracking; GL themes ground this with concrete financial-governance mechanisms (e.g., Technology Business Management), product-outcome measurement, and quantitative sophistication.	13	27	40
MT4.5 Cross-Level Collaboration and Stakeholder Communication	<ul style="list-style-type: none"> • WL Theme 3: Capacity-Constrained Delivery Pressure (n=4) Portfolio Resource buffer; Effective Resource allocation; Dynamic portfolio 	<ul style="list-style-type: none"> • GL Theme 8: Relentless Operational Excellence (n=3) Tool-Enabled Data Translation; Data-driven IT cost optimization; Relentless Improvement 	WL themes establish that portfolio governance depends on recurring communication routines rather than one-off decisions, extended across capacity review and complexity-	12	3	15

	balancing; Real-time resource governance		driven coordination demand; the GL theme confirms this through practitioners' commitment to continuous, data-driven operational review.			
	<ul style="list-style-type: none"> • WL Theme 4: Cross-level collaboration patterns (n=7) • Continuous collaboration; Effective communication with customers; PMO-enabled organizational collaboration; Broadening the involved actors in control 					
	Theme 15: Portfolio complexity management (n=1)					
	Effective negotiations by PMO					
MT4.6	WL Theme 15: Portfolio complexity management (n=1)	• GL Theme 9: Paradox Management (n=3)	WL themes establish that	2	3	5
Complexity	Sequential implementation of interdependent projects	Paradox, not Problem; Value as Objective, Cost as Constraint; Balanced executable plan	requires a governance logic distinct from single-project management, centered on the exploration/exploitation paradox; the GL theme, though based on few codes, is included for its analytical distinctiveness, reframing this MT as a mature governance perspective.			
Navigation and Interdependency Governance	<ul style="list-style-type: none"> • WL Theme 29: Strategic ambidexterity tension (n=1) 					
	Structuring administration vs uncertainty management					

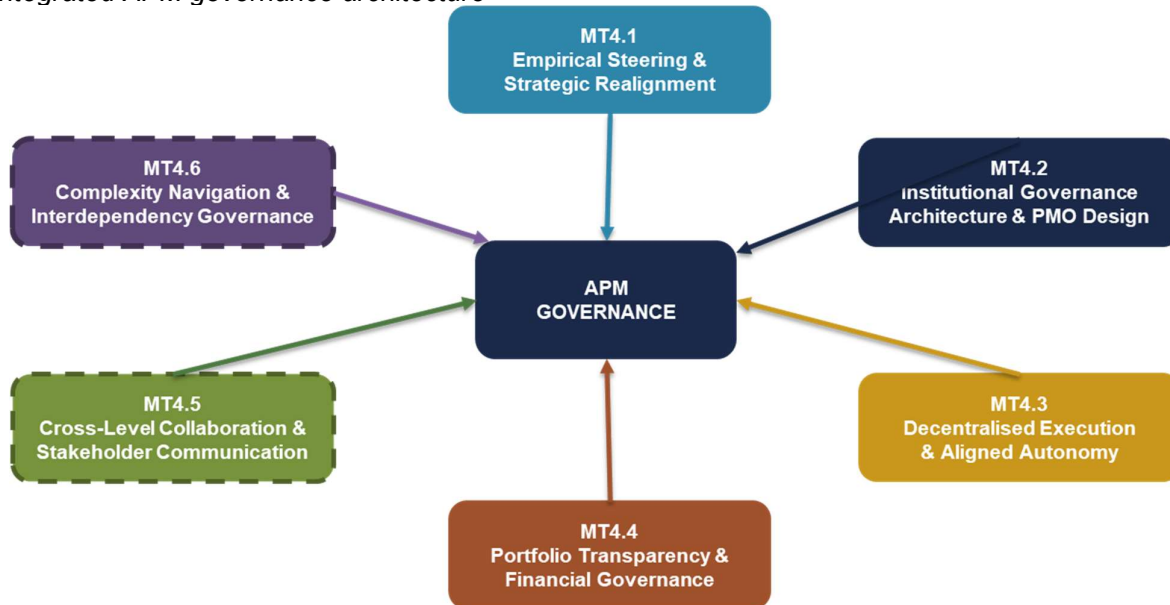
Note. Theme numbers are labels only from the consolidation step and do not indicate rank (see Section 3.7.3).

Figure 4-5
RQ4 Extract Counts by Merged Theme (Academic vs Practitioner)



An integrated architecture model represents governance not as a checklist of independent practices but as a system in which distinct functions interact and depend on each other to produce outcomes that none could achieve alone. In the same way that an IT system requires its components such as databases, APIs, interfaces, and security controls to work together rather than in isolation, portfolio governance depends on its mechanisms operating in concert. **Figure 4-6** maps how the six RQ4 governance mechanisms relate in this way, showing which functions support which, and explaining why weaknesses in any single mechanism undermine the effectiveness of the whole.

Figure 4-6
Integrated APM governance architecture



4.6.1 MT4.1: Empirical Steering and Strategic Realignment (n = 110)

MT4.1 draws primarily on Theme 1 (Adaptive Portfolio Governance), which captures the full range of iterative portfolio-level decision-making, continuous re-prioritisation, and dynamic investment criteria that constitute adaptive steering. The dominant grey literature contribution comes from Theme 1 (From Predictive Control to Empirical Steering), the GL theme with the most extracts in the review, supplemented by Theme 10 (Empirical Learning Culture), which provides the organisational learning dimension of adaptive governance.

The 110 extracts were contributed from 22 sources (9 WL, 13 GL). The grey literature source, GL-2-02 supplies 47 of them (43%), so the grey literature account rests heavily on one source. The white literature supplies the governance vocabulary of empirical steering, such as rolling-wave planning and dynamic investment criteria, and the grey literature adds the learning culture that keeps steering empirical.

The academic literature provides the theoretical grounding. As EBSCO-8 (Harake, 2025) describes the fundamental shift that adaptive governance requires: "Agile approaches exemplify a shift from predictive planning to adaptive planning i.e. instead of attempting to predict and control every task upfront, Agile teams continuously adapt plans based on real project dynamics and feedback." Operationally, this necessitates that organizations re-evaluate their entire project portfolio in

compressed planning cycles typically every three months and maintain the institutional courage to abandon initiatives when projected benefit realization becomes insufficient.

The grey literature goes further, translating these principles into specific governance routines. GL-2-02 ("Lean Portfolio Management Discipline," n.d.) provides a detailed account of adaptive governance in operation. Its codes include "vision-to-value synchronicity," "seamless strategic cascading," "decisive strategic pivoting," "evidence-based endurance," and "burying the sunk cost". These codes name what adaptive governance may require of organisations: stopping investments that no longer generate value, even when significant resources have already been committed. GL-2-02 ("Lean Portfolio Management Discipline," n.d.) also introduces the idea of "empowered financial boundaries" that is the principle which teams operating within adaptive governance need clear financial constraints which they can make decisions autonomously, rather than having every budget decision escalated to the portfolio board

GL-3-27 (*Portfolio Management Mindset*, n.d.) contributes several specific governance mechanisms such as Portfolio Kanban that emerges as the essential flow management apparatus, serving to visualize work, limit work-in-process, and institutionalize transparency across the enterprise. Continuous planning is materialized through year-round "rolling-wave" activities, where detailed granularity is reserved for initiatives within a six-hour horizon. The contrast between risk-based and artefacts-based governance is important. Artefacts-based governance checks whether the right documents have been produced. Risk-based governance asks whether the right bets are being made and whether the assumptions behind those bets are being tested (Joslin & Müller, 2015; Lappi et al., 2018). The most important single observation in this theme comes from PMI's Portfolio Management of Enterprise Agility (2022) "Real agility is not Agile versus Waterfall; enterprise agility is portfolio management," reframing Agile Portfolio Management (APM) as the organizational realization of agile principles at scale rather than a mere extension of team-level practices(*Portfolio Management of Enterprise Agility*, n.d.).

GL-3-49 (*Strategic Planning and Lean Portfolio Management*, n.d.) introduces the concept of Objectives and Key Results(OKRs) by suggesting codes like "OKR comparison of strategic initiatives" and "dynamic reassessment of investments based on OKRs.", OKR as a goal-setting framework, provides portfolio governance with a mechanism for expressing strategic intent in terms that are both measurable and adaptable The integration of OKRs further strengthens this architecture, providing a mechanism for expressing strategic intent in terms that are both measurable

and adaptable. By utilizing an "envision-evolve approach," organizations treat the portfolio as a system for testing strategic hypotheses incrementally.

Knaster & Leffingwell, 2020 describes a quarterly Strategic Portfolio Review supported by a monthly Lean Portfolio Management synchronisation and continuous portfolio Kanban management. (Scaled Agile, Inc, 2023) adds Program Increment cycles as the team-portfolio bridging cadence.

4.6.2 MT4.2: Institutional Governance Architecture and PMO Design (n = 85)

MT4.2 addresses the institutional design question for RQ4. It addresses questions like what formal governance structures, roles, and accountability mechanisms does effective APM require? It builds on MT1.5 (which addressed governance structures as a rationale) by providing the design specification, not just the rationale.

MT4.2 draws on Theme 16 (Portfolio governance structures), the dominant white literature theme for RQ4, which addresses the formal roles, authority structures, and institutional configurations through which portfolio governance is organised, and Theme 38 (Distributed governance & accountability), which addresses the accountability dimension of distributed governance design. The grey literature contribution comes from Theme 3 (Strategic Resilience & Stewardship), providing practitioner evidence on how strategic governance bodies — whether PMOs or Value Management Offices — exercise their stewardship responsibilities across the portfolio.

The 85 extracts for this merged theme come from 30 sources (21 WL, 9 GL); no source supplies more than 10%. The white literature describes formal PMO structures and a shift towards distributed accountability, and the grey literature adds detail on governance bodies, roles and strategic-alignment practice.

The formal literature provides a foundational description of this architecture. Scopus-164 (Stettina & Hörz, 2015) provides a compact description of portfolio governance architecture: "the portfolio management team maintains the portfolio vision, allocates resources to value streams through investment themes and defines and prioritises a portfolio backlog." This description contains several important elements: a portfolio management team (not just a PMO but a cross-functional governance body), a portfolio vision (strategic intent expressed at the portfolio level), investment themes (the mechanism for distributing resources across value streams), and a portfolio backlog (the ordered list of strategic initiatives). SCOPUS-RQ2-13 (Hoffmann et al., 2020) suggests to add the authority dimension: "organisations should install strong portfolio managers equipped with appropriate autonomy and authority for their activities, and should build the ability to mitigate arising conflicts

across all organisational levels." However, scholarship emphasizes that governance is not a universal template but a context-dependent capability (Killen & Hunt, 2013). For instance, a regulated financial institution may require more structured accountability frameworks, whereas an innovative startup in a volatile digital ecosystem may benefit from more iterative, lightweight approaches. This has been mentioned in EBSCO-8 (Harake, 2025). This is an argument for governance contextualisation rather than universal framework adoption.

Practitioner-led evidence documents the evolutionary PMO, tracking its transition from a "dictator of work" to a "connecting fabric" situated at the strategic planning table. GL-1-17 (*Accelerating Strategy Execution: Effective Portfolio, Program and Project Management*, n.d.) describes a shift from a traditional administrative PMO to a "centre of excellence for capability and change leadership." GL-2-02 ("Lean Portfolio Management Discipline," n.d.) introduces the concept of the "VMO" (Value Management Office) as a governance body focused on value realisation rather than project compliance. GL-3-33 (*Innovation, Portfolio Management, and Agility as a Happy Family*, n.d.) frames the governance body as a "portfolio as governance body aligning strategic objectives" and not as a reporting mechanism but as an active decision-making body. The VMO concept represents a specific institutional response to the limitations of traditional PMO models: a compliance-oriented governance body develops expertise in process standards. A value-oriented governance body develops expertise in benefit assessment, outcome measurement, and investment trade-off analysis.

EBSCO-RQ1-7 (Alves Teixeira & Drebes Pedron, 2023) contextualisation argument that governance architecture must fit organisational context, has specific implications for the MT4.2 findings. The academic literature describes a portfolio governance architecture (portfolio management team, investment themes, portfolio backlog, portfolio vision) that reflects a particular context: a large organisation with multiple value streams, committed leadership, and mature Agile delivery practices at the team level.

The authority dimension of portfolio governance is one area where the academic literature is more emphatic than the grey literature, and SCOPUS-RQ2-13's (Hoffmann et al., 2020) insistence that portfolio managers need appropriate autonomy and authority is backed by a consistent pattern across the WL sources. Well-designed governance structures that lack decision-making authority produce documentation, not decisions. Portfolio reviews that can recommend but not act become forums for discussing problems rather than resolving them. The authority question is partly organisational, who has the mandate to stop a project, reallocate budget, or change investment

priorities, and partly cultural: whether the organisation treats portfolio governance decisions as genuine constraints on project behaviour or as suggestions that can be appealed through other channels.

4.6.3 MT4.3: Decentralised Execution with Aligned Autonomy (n = 52)

MT4.3 addresses a central governance design challenge for RQ4: how to decentralise execution without losing strategic alignment. All four contributing themes address different aspects of this same fundamental tension about the balance between team autonomy and portfolio coherence. The GL evidence is dominant (GL/WL = 3.73) in this theme.

MT4.3 synthesises Theme 7 (Decentralised execution patterns) and Theme 23 (Portfolio-Level Agility & Value), which together address the mechanisms through which effective APM distributes decision authority to teams while maintaining strategic alignment at the portfolio level. The grey literature draws from Theme 2 (Operationalizing Flow & Capacity), which provides flow-based decentralisation mechanisms such as minimum business increments and early project decomposition, and Theme 4 (Behavioural & Institutional Anchors), which addresses the cultural and relational foundations of meaningful team empowerment.

The 52 extracts for this merged theme were extracted from 20 literature sources (7 WL, 13 GL) where GL-3-26 supplies 15 extracts.

One of the most persistent tensions in Agile portfolio management is the question of how much authority to centralise and how much to distribute. Merged Theme 4.3 (MT4.3) examines the dialectical tension between centralized strategic oversight and the decentralization of decision authority, a fundamental challenge in sustaining Large-Scale Agile Software Development (LSASD). This theme focusses on the mechanisms through which effective APM gives teams meaningful autonomy while maintaining portfolio-level alignment.

SCOPUS-RQ1-24 (Dias & Tenera, 2023) provides the academic framing of the central concept: "The OKRs should help the organisation to achieve the challenging 'aligned autonomy,' by empowering teams to set their own Key Results. This will enable the organisation to achieve an overarching objective derived from its strategy." The academic discourse characterizes the synthesis of these opposing forces as "aligned autonomy," positioning Objectives and Key Results (OKRs) as the critical mediating mechanism.

Scopus-164 (Stettina & Hörz, 2015) identifies the structural dimension for this theme "instead of a project manager defining and delegating the tasks to the team, a backlog of all work items is created, and updated in each iteration. The team members then actively 'pull' their tasks from there." Scaled to the portfolio level, this requires that the portfolio backlog be structured in a way that makes strategic priorities clear enough for teams to make sensible decisions autonomously.

The grey literature in this theme is rich on implementation mechanisms. GL-3-26 (*Lean Portfolio Management-Maximizing Value Across Many Programs*, n.d.) introduces "early project decomposition" and "strategic pre-iteration deconstruction": the practice of breaking down large strategic initiatives before they enter the delivery pipeline, which is what makes them amenable to decentralised, iterative execution. GL-3-27 (*Portfolio Management Mindset*, n.d.) advocates for "small initiatives over large initiatives" and "stable teams over project teams", two design principles that together reduce coordination overhead and increase team autonomy by eliminating the constant reformation of teams around projects. GL-3-49 (*Strategic Planning and Lean Portfolio Management*, n.d.) adds the concept of "value-centric granularity (MBI)", the minimum business increment approach, where initiatives are decomposed to the smallest unit that delivers independent business value. GL-2-02 ("Lean Portfolio Management Discipline," n.d.) synthesises several mechanisms under "domain-driven autonomy" and "empowerment through trust": the idea that sustained team autonomy requires not just structural permission but genuine organisational trust, which has to be built through a track record of good decisions rather than granted by policy.

The minimum business increment concept from GL-3-49 (*Strategic Planning and Lean Portfolio Management*, n.d.) connects directly to the structural design question that MT4.3 is concerned with. This is frequently articulated through the concept of "value-centric granularity" or Minimum Business Increments (MBIs), allowing teams to execute iteratively against the smallest possible units of business value. MBI decomposition produces units sized for value delivery which is the smallest piece of work that, when delivered independently, generates a business outcome that can be measured and validated (Ambler & Lines, 2020b; *Strategic Planning and Lean Portfolio Management*, n.d.)

4.6.4 MT4.4: Portfolio Transparency and Financial Governance (n = 40)

MT4.4 addresses the measurement and financial transparency infrastructure of effective APM. The question answered by this MT is: how do organisations see what their portfolio is doing and communicate value to the business?

MT4.4 draws on Theme 21 (Portfolio transparency and visibility), which captures holistic, centralised visibility of projects, resources, and performance that enables evidence-based portfolio decisions, alongside Theme 19 (Portfolio risk optimisation), which adds the risk governance dimension in incorporating risk metrics, probability-weighted investment decisions, and scenario-based analysis into the portfolio transparency infrastructure, and Theme 6 (Customer-centric value delivery). The grey literature contribution comes from Theme 5 (The Financial Translation Layer), Theme 6 (Product-Centric Stewardship), and Theme 7 (Algorithmic Governance), providing the Technology Business Management concepts and algorithm-based prioritisation mechanisms. The 40 extracts for this theme come from 14 sources (9 WL, 5 GL); GL-2-18 supplies 12 of them. The white literature treats transparency as the information base for portfolio decisions, extended to risk data and customer value, and the grey literature adds financial-governance mechanisms, product-outcome measurement and quantitative methods. IEEE-03 (Bechtel et al., 2022) establishes the basic visibility argument stating that "through operational control, portfolio managers detect risks and interdependencies between projects that might not be visible on the single project level." IEEE-13 (Vazifeh-Noshafagh et al., 2022) adds the tracking dimension to this team by highlighting "tracking the work items from team to portfolio levels": the infrastructure that connects delivery-level progress to portfolio-level strategy. SCOPUS-RQ1-6(Jerbrant, 2014) identifies uncertainty management often performed by the PMO as a mechanism for balancing structural requirements against the need for situational leadership. EBSCO-5 (Müller et al., 2025) adds that agile boundary systems provide guardrails to create risk awareness and avoid undesirable outcomes while encouraging the adaptation of innovation projects to exploit opportunities. GL-2-18 (Accelerating Business Value with SAFe® and Technology Business Management, 2020) describes the "Bill of IT" concept as a structured presentation of IT spending in business-comprehensible terms, which addresses the communication gap between IT cost accounting and business value perception. GL-2-18 (Accelerating Business Value with SAFe® and Technology Business Management, 2020) also introduces "run vs. change rebalancing" which means the governance practice of distinguishing between operational IT spending and change investment, and making the balance between them an explicit portfolio governance decision. GL-2-18 (Accelerating Business Value with SAFe® and Technology Business Management, 2020) further argues for a "standard taxonomy for alignment", addressing the problem of different parts of the organisation using different vocabulary for the same portfolio concepts, making portfolio-level conversations structurally difficult.

GL-5-06 (*Value-Driven Digital Business*, n.d.) raises the measurement philosophy dimension by introducing "fuzzy measures of important things" as an argument against the tendency to measure

only what is easy to measure, asserting that portfolio governance should tolerate imprecise metrics for strategically important outcomes rather than defaulting to precise metrics for operationally convenient proxies. GL-3-33 (*Innovation, Portfolio Management, and Agility as a Happy Family*, n.d.) introduces "value-based decision criteria over static plans" and "gate control shifted to value realisation focus", both of which describe a governance transition from milestone-based to value-based portfolio reviews. GL-1-17 (*Accelerating Strategy Execution: Effective Portfolio, Program and Project Management*, n.d.) adds the technology dimension: "real-time portfolio visibility enabled by AI and automation" and "enterprise-wide accountability through shared metrics and transparency." (Fagarasan et al., 2023) connects portfolio transparency directly to OKR-based governance, arguing that 'delivery excellence is crucial to attaining the set OKRs' and that organisations must emphasise 'transparency in their portfolio governance,' with the aim of providing 'real-time, accurate delivery performance data that cater to the needs of all stakeholders.' Scopus-7 (Alves & Gonçalves, 2023) establishes that customer involvement throughout project development helps teams deliver value and improve business results.

4.6.5 MT4.5: Cross-Level Collaboration and Stakeholder Communication (n = 15)

MT4.5 addresses the operational cadences and communication routines that sustain portfolio governance day-to-day. While MT4.1 addresses the governance mechanisms and MT4.2 the governance structures, this MT addresses the relational and rhythmic practices that make governance work as a lived organisational reality rather than a structural blueprint.

MT4.5 draws on Theme 4 (Cross-level collaboration patterns), which directly addresses the governance communication routines through which portfolio coherence is maintained across organisational levels, Theme 3 (Capacity-Constrained Delivery Pressure), and Theme 15 (Portfolio complexity management), which establishes that communication infrastructure must scale with portfolio complexity and as portfolio complexity grows, the communication demand on governance bodies increases non-linearly and requires deliberate information architecture decisions about what is surfaced to which governance level and at what cadence. The grey literature contribution comes from Theme 8 (Relentless Operational Excellence), providing practitioner evidence on the continuous improvement and operational cadences that sustain portfolio coherence. The 15 extracts come from 10 sources (9 WL, 1 GL); all three grey extracts come from GL-2-18. The white literature describes recurring communication routines, not one-off decisions, as what sustains portfolio governance, and the grey extracts point to continuous, data-driven operational review.

MT4.5 addresses the communication infrastructure of effective APM such as the recurring routines, stakeholder engagement practices, and collaborative artefacts that maintain portfolio coherence in large and distributed organisations.

IEEE-10 (Suárez-Gómez & Hoyos-Vallejo, 2023) offers the most direct statement in favour of this theme "transparency in communication and agile practices (e.g., Daily Standups, Retrospectives, and Reviews) developed by the teams generated an environment of collective responsibility and continuous progress." Scopus-128 (Aghajani et al., 2023) extends this to the portfolio level: "agile teams and customers should play an active role in portfolio decision-making. Such active involvement enhances communication and collaboration." SCOPUS-RQ1-6 (Jerbrant, 2014) positions the PMO manager as a communication coordinator: "the PMO manager is also responsible for performing many of the management activities that provide the necessary organisational collaboration in a project-based business." GL-2-18's (Accelerating Business Value with SAFe® and Technology Business Management, 2020) codes such as "tool-enabled data translation," "data-driven IT cost optimisation," and "relentless improvement", describe the continuous communication and learning loops that sustain an adaptive portfolio governance system over time.

4.6.6 MT4.6: Complexity Navigation and Interdependency Governance (n = 5)

The final theme in RQ4 examines the hardest governance problem of all which is managing genuine complexity at portfolio scale. When many projects interact by sharing infrastructure, competing for the same specialists, depending on each other's outputs then the interactions between those projects generate governance challenges that cannot be solved by managing each project well individually. MT4.6 also addresses the fundamental paradox at the heart of portfolio governance: every organisation needs to simultaneously maintain and improve what it already has (exploitation) while exploring and investing in genuinely new capabilities (exploration). These two activities demand incompatible governance styles, and managing both at once is the central unsolved problem in the field.

MT4.6 draws on Theme 15 (Portfolio complexity management), which addresses the governance of interdependencies and complexity at portfolio scale, and Theme 29 (Strategic ambidexterity tension), which provides the academic framing of the central governance paradox: how portfolio bodies manage simultaneous exploitation demands (delivering current commitments) and exploration demands (investing in future capability) within the same governance system, and how the tension between tight and loose coupling of interdependent projects is precisely the structural manifestation of this paradox. The grey literature contribution comes from Theme 9 (Paradox

Management), which adds the practitioner perspective on managing trade-offs as enduring tensions rather than problems to be resolved. The 5 extracts for this theme were extracted from 4 sources (2 WL, 2 GL); GL-5-06 supplies 2 of them. The white literature points to a governance logic distinct from single-project management, centred on the exploration-exploitation paradox; with five extracts, this evidence is thin.

SCOPUS-RQ2-13 (Hoffmann et al., 2020) notes that "IT PPM should sequentially execute interdependent projects" to "increase execution speed and minimise coordination efforts" which is a recommendation that prioritises flow efficiency over parallel execution. SCOPUS-RQ1-6 (Jerbrant, 2014) acknowledges the fundamental tension in project-based organisations: "the management of project-based organisations evolves between structuring administration and managing any uncertainty", which is a way of saying that interdependency management lives at the fault line between structure (which is needed to coordinate) and flexibility (which is needed to respond to the unexpected).

The grey literature brings a paradox framing to this theme. GL-5-06 (*Value-Driven Digital Business*, n.d.) introduces "paradox, not problem". It means that the tension between centralised coordination and decentralised autonomy in interdependency management is not a problem to be solved but a paradox to be managed. GL-5-06 (*Value-Driven Digital Business*, n.d.) also introduces "value as objective, cost as constraint". It is a framing for portfolio trade-off decisions that positions strategic value as the primary optimisation criterion and cost as a boundary condition rather than a primary objective. GL-3-33 (*Innovation, Portfolio Management, and Agility as a Happy Family*, n.d.) adds another dimension of "balanced executable plan": It is the observation that the output of good interdependency governance should be a portfolio plan that is both strategically coherent and operationally feasible, which requires genuine negotiation between strategic ambition and delivery capacity. SCOPUS-RQ2-13's (Hoffmann et al., 2020) recommendation to sequentially execute interdependent projects, prioritising flow efficiency over parallel execution,

The GL-3-33 (*Innovation, Portfolio Management, and Agility as a Happy Family*, n.d.) adds "balanced executable plan" concept is worth returning to in this context, because it names the output that good interdependency governance is trying to produce. According to this finding, a plan is balanced when strategic ambition and delivery capacity are genuinely aligned, not when one is subordinated to the other. It is executable when the dependencies between components have been identified and managed to the point where parallel execution does not create blocking. Producing such a plan at scale, across dozens of teams and hundreds of initiatives, is a governance challenge that requires

both analytical capability (to model the dependencies) and political capability (to negotiate the trade-offs). The reviewed literature documents the goal without fully describing the path to it, which reflects the genuine difficulty of the problem rather than a gap in practitioner experience.

The small evidence base in MT4.6 establishes that the conceptual framing for interdependency governance is moving away from engineering approaches (map all dependencies and manage them as constraints) toward adaptive approaches (design the system to reduce unnecessary dependencies and manage remaining ones through governance rhythms rather than comprehensive plans).

4.6.7 RQ4 Summary: Key Findings

The six RQ4 themes together describe an effective APM governance model. MT4.1 (n=110) provides the dynamic core of the adaptive mechanisms through which portfolio governance maintains responsiveness to strategic change. MT4.2 (n=85) provides the institutional architecture that gives these mechanisms legitimacy and decision-making authority. MT4.3 (n=52) describes how effective APM distributes decision-making to delivery teams through aligned autonomy while maintaining portfolio coherence. MT4.4 (n=40) addresses the visibility and measurement infrastructure that makes portfolio decisions evidence-based rather than intuition-based. MT4.5 (n=15) describes the communication routines and stakeholder engagement practices that maintain coherence in distributed organisations. MT4.6 (n=5), the smallest theme, identifies interdependency management as a research-practice gap.

4.7 Cross-Theme Analysis: Recurring Tensions and Analytical Patterns

The cross-theme analysis identified four tensions. They were formed after the 16 merged themes had been set, by reading the coded extracts and merged themes against each other; no memo records the steps. They draw on seven merged themes from RQ1 and RQ4 that describe governance mechanisms (MT1.1, MT1.2, MT1.5 and MT4.1 to MT4.4), and Appendix K lists the extracts that illustrate each pole. They aren't contradictions in the evidence or weaknesses in the coding. They are built into portfolio governance itself: competing demands that can't be settled by picking one side. That explains why no single governance configuration works everywhere, and why effective APM is a balancing act rather than a design choice. The 16 themes don't add up to one prescriptive model; they add up to a problem that each organisation has to work out for itself. **Figure 4-7** maps where each tension sits and which themes generate evidence for each tension.

The first and most pervasive tension is between centralisation and decentralisation. MT1.1(Portfolio Value Realisation Through Strategic Alignment) and MT4.2(Institutional Governance Architecture and PMO Design) argue for portfolio-level governance with clear authority and institutional architecture, mechanisms that by definition centralise certain decisions at the portfolio level. MT4.3(Decentralised Execution with Aligned Autonomy) argues for aligned autonomy and team empowerment mechanisms that deliberately push decision-making authority toward the teams doing the work. These two arguments are not contradictory but they create a genuine design tension: every additional responsibility given to the portfolio governance body is a responsibility taken from the teams, and vice versa. The literature does not resolve this tension; it describes mechanisms for managing it. OKRs (GL-3-49 (*Strategic Planning and Lean Portfolio Management*, n.d.)) establish strategic direction centrally while leaving implementation decisions to teams. Investment themes (Scopus-164 (Stettina & Hörz, 2015)) allocate budgets centrally while giving value streams discretion over how to use them. Empowered financial boundaries GL-2-02 (“Lean Portfolio Management Discipline,” n.d.) define constraints centrally while authorising spending locally.

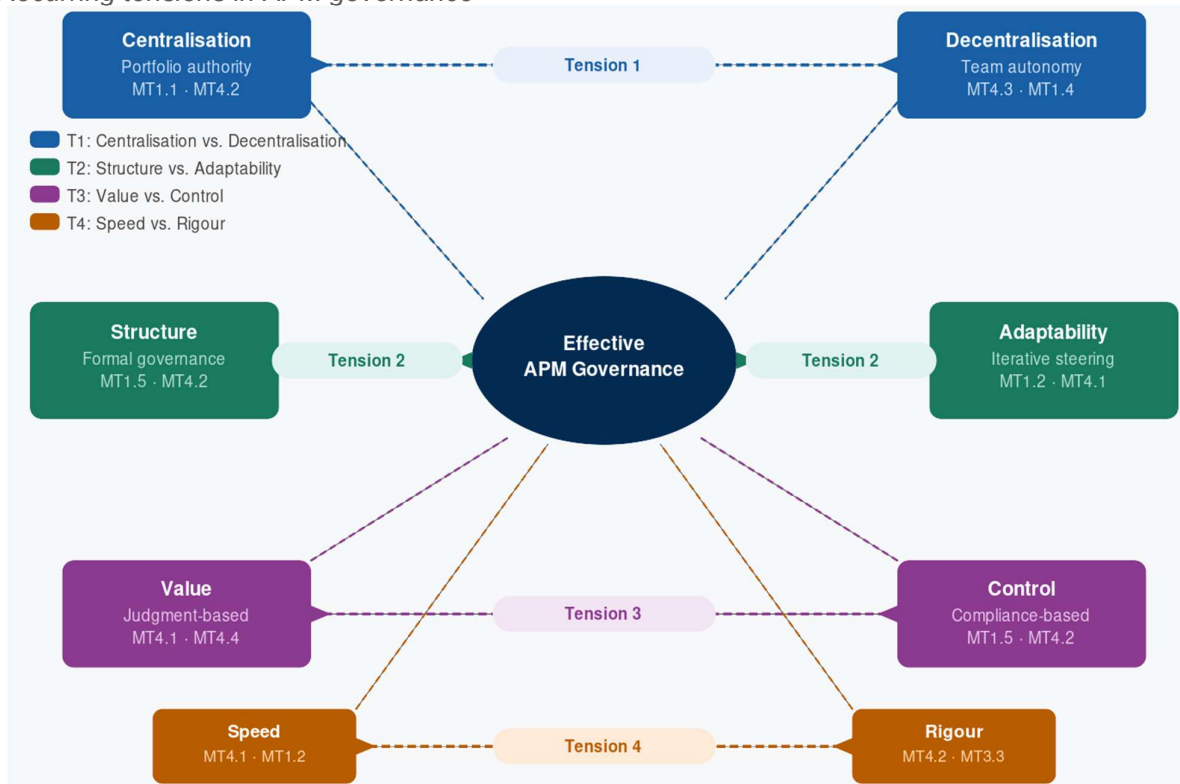
The second recurring tension is between structure and adaptability. MT1.5(Formal Governance Infrastructure and PPM Architecture) and MT4.2(Institutional Governance Architecture and PMO Design) describe formal governance architecture (structures, roles, and processes) that provides the legitimacy and accountability that portfolio governance requires. MT1.2(Empirical Adaptive Governance) and MT4.1(Empirical Steering and Strategic Realignment) describe adaptive governance mechanisms such as rolling-wave planning, portfolio Kanban, and hypothesis-driven delivery, that require the governance system to remain fluid and responsive. The EBSCO-RQ1-7 (Alves Teixeira & Drebes Pedron, 2023) contextualisation argument, that governance architecture must fit organisational context, is one way of managing this tension: different contexts call for different points on the structure-adaptability spectrum, and the right point will change as the organisation matures and the environment changes.

The third tension is between value and control. The shift from deliverables-based governance to value-based governance that runs through MT4.1(Empirical Steering and Strategic Realignment), MT4.2(Institutional Governance Architecture and PMO Design), and MT4.4(Portfolio Transparency and Financial Governance) is, analytically, a shift away from control and toward judgment. This pairing is the researcher’s interpretation of the extracts listed in Appendix K; none of them was coded as a statement of value and control as a tension.

The fourth tension is between speed and rigour. The adaptive governance mechanisms discussed in MT4.1(Empirical Steering and Strategic Realignment), such as rolling-wave planning, hypothesis-driven delivery, and portfolio Kanban, are designed to make portfolio decision-making faster and more responsive. This pairing is the researcher's interpretation. The extracts in Appendix K describe fast-moving mechanisms (MT4.1) and validation or formal review (MT4.1 and MT4.2), but none of them was coded as a statement that speed and rigour conflict.B

Figure 4-7

Recurring tensions in APM governance



Note: Each tension connects two legitimate governance demands that pull in opposite directions. Dashed bi-directional arrows indicate that neither pole eliminates the other; effective governance manages the balance rather than resolving it. Theme codes indicate which merged themes generate evidence for each pole.

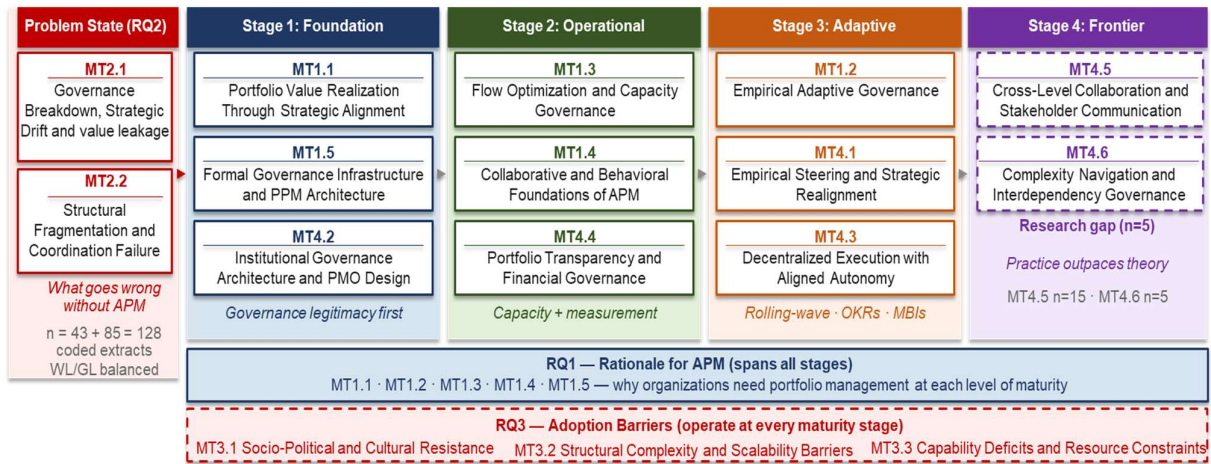
The cross-theme analysis also points to a dimension of APM governance that is less well-covered in the individual theme analyses that is the temporal dimension of governance maturity.

Organisations do not develop all governance capabilities simultaneously, but build foundational practices first, with more sophisticated capabilities only becoming viable once those foundations are stable (Killen & Hunt, 2013). **Figure 4-8** applies this developmental lens to the 16 merged themes of

this review, arranging them in the sequence in which the evidence suggests they most productively build on each other. **Figure 4-8** draws together all 16 merged themes and all four research questions into something the literature doesn't yet offer: a developmental sequence for APM governance capability. The sequencing isn't chronological and it isn't prescriptive. It follows the dependency logic the evidence implies i.e. what has to be in place before something else works. This matters practically. Organisations that implement advanced governance mechanisms before the foundations are stable aren't just under-resourced; they're sequencing incorrectly, which is a different kind of problem. The adoption barriers findings in MT3.1 to MT3.3 document this pattern directly. **Figure 4-8**, built from 923 coded extracts across 41 sources, makes the correct sequence explicit

The leftmost column (red) in **Figure 4-8** shows the RQ2 problem state that is the conditions that motivate organisations to begin an APM governance journey. MT2.1(Governance Breakdown, Strategic Drift & Value Leakage) describes governance breakdown, strategic drift, and value leakage and what happens when strategic intent and portfolio execution are decoupled. MT2.2(Structural Fragmentation and Coordination Failure) describes structural fragmentation, resource instability, and coordination failure as the operational consequences of absent portfolio governance. Together they represent the "before" state against which the four maturity stages are a response. Stage 1 (Foundation, blue) establishes governance legitimacy through strategic alignment (MT1.1), PMO infrastructure (MT1.5), and institutional architecture (MT4.2). Stage 2 (Operational, green) makes the foundation functional through resource and flow management (MT1.3), behavioural enablers (MT1.4), and portfolio visibility (MT4.4). Stage 3 (Adaptive, amber) adds the capabilities that distinguish mature APM from static governance: adaptive mechanisms including rolling-wave planning and portfolio Kanban (MT4.1), market responsiveness (MT1.2), and decentralised aligned autonomy (MT4.3). Stage 4 (Frontier, purple) marks where the reviewed literature is thinnest: communication routines (MT4.5) and interdependency management (MT4.6 dashed). The RQ1 rationale band across the bottom reflects that the reasons for adopting APM span all maturity stages, not only the initial adoption decision. The RQ3 barrier band confirms that cultural, structural, and capability barriers operate at every stage of the journey.

Figure 4-8
APM Governance Developmental Map



Note: The 16 merged themes arranged as a developmental sequence: RQ2 problem drivers on the left, four maturity stages reading left to right, RQ1 rationale band and RQ3 adoption barriers across the bottom. MT4.6 dashed border indicates a research gap.

4.8 Summary

Chapter 4 has reported 16 merged themes across the four research questions. RQ1 (MT1.1–MT1.5) covered the strategic rationale for APM, RQ2 (MT2.1–MT2.2) the consequences of its absence, RQ3 (MT3.1–MT3.3) the barriers to adoption, and RQ4 (MT4.1–MT4.6) the governance mechanisms through which effective APM maintains strategic alignment. The cross-theme analysis (Section 4.7) identified four recurring tensions: centralisation versus decentralisation, structure versus adaptability, value versus control, and speed versus rigour. These tensions are presented as design challenges that APM governance may need to manage actively. Chapter 5 discusses these findings and their implications.C

Chapter 5 Discussion

5.1 Introduction

This chapter interprets and contextualises the findings reported in Chapter 4 against the existing body of knowledge in Agile Portfolio Management (APM). Chapter 4 reported the findings of the Multivocal Literature Review (MLR). This chapter asks what those findings mean, what they contribute to the field, and what they imply for practitioners and researchers.

The chapter is organised in two parts. Part A (Section 5.2) addresses why APM is needed (RQ1) and what organisations lose without it (RQ2). Part B (Section 5.3) examines the governance response: the barriers to adoption (RQ3) and what effective APM looks like in practice (RQ4). Section 5.4 presents a conceptual framework, Section 5.5 draws implications for research and practice, and Section 5.6 summarises the chapter.

The WL/GL distinction is central to the analysis rather than merely methodological. Academic researchers have produced the strongest accounts of why governance is needed and what governance structures look like institutionally. Practitioners have produced the strongest accounts of how adaptive governance operates day to day. Both accounts are incomplete without the other. Treating the two literatures as interchangeable would obscure the key finding that is most distinctive about this study. The WL/GL comparison in each section below is, in several cases, the main finding.

Table 5-1 summarises the evidence base across all four research questions and provides a reference point for the quantitative claims that follow.

Table 5-1
Evidence Base Summary Across All Four Research Questions

RQ	Focus	WL Codes	GL Codes	Total	GL: WL Ratio	Merge Themes
RQ1	What is the need to adopt portfolio management in large-scale Agile software development?	199	170	369	0.9:1	5
RQ2	What are the challenges that large-scale organizations face in the absence of Agile Portfolio Management?	58	70	128	1.2:1	2
RQ3	What are the barriers that stop organizations from implementing PPM?	63	56	119	0.9:1	3

RQ4	What specific governance structures, roles, and decision-making processes within Agile Portfolio Management support continuous alignment with evolving business objectives?	118	189	307	1.6:1	6
TOTAL	All four research questions	438	485	923	1.1:1	16*

Note: * MT1.5 contributes to both RQ1 and RQ4 discussion — 16 distinct MTs across 17 reported entries. explicitly.

Table 5-2 extends **Table 5-1** by mapping the WL/GL knowledge balance across all 16 individual merged themes, showing where WL extracts predominate, where GL extracts predominate, and where the evidence base is thin in both communities.. This map is the analytical backbone for the discussions that follow in each section. Reading the table from left to right, themes with a GL:WL ratio above 1.0 have more GL than WL extracts; those below 1.0 have more WL extracts (Section 4.2 explains what the ratio can and cannot show). Themes with low extract counts in both columns signal knowledge gaps that the subsequent sections flag explicitly.

Table 5-2
WL vs GL knowledge lead across all 16 merged themes

MT	Theme Name	WL	GL	Ratio	Extract balance
MT1.1	Portfolio Value Through Strategic Alignment	78	38	0.5:1	Academic-led strategic alignment theory well established in WL
MT1.2	Empirical Adaptive Governance	24	67	2.8:1	Practitioner-led — adaptive mechanisms documented mainly in GL
MT1.3	Flow Optimization and Capacity Governance	27	37	1.4:1	Practitioner-led — operational flow documented in GL
MT1.4	Collaborative and Behavioral Foundations	33	28	0.8:1	Balanced as both communities contribute
MT1.5	Formal Governance Infrastructure & PPM Architecture	37	0	WL only	Academic-led — PMO theory exclusive to WL (no GL contribution)
MT2.1	Strategic Drift and Value Leakage	12	31	2.6:1	Practitioner-led — failure modes described from operational experience
MT2.2	Structural Fragmentation and Coordination Failure	46	39	0.8:1	Balanced — comparable convergence across both literatures
MT3.1	Socio-Political and Cultural Resistance	11	37	3.4:1	Practitioner-led — political/cultural barriers most visible in GL

MT3.2	Structural Complexity and Scalability Barriers	28	15	0.5:1	Academic-led — ambidexterity theory and structural analysis
MT3.3	Capability Deficits and Resource Constraints	24	4	0.2:1	Academic-led — capability gap literature well theorized
MT4.1	Empirical Steering and Strategic Realignment	20	90	4.5:1	Strongly practitioner-led — highest GL dominance in entire review
MT4.2	Governance Structures, PMO Roles & Architecture	60	25	0.4:1	Academic-led — only WL-majority RQ4 theme
MT4.3	Decentralization, Team Empowerment & Aligned Autonomy	11	41	3.7:1	Practitioner-led — aligned autonomy design documented in GL
MT4.4	Portfolio Visibility, Metrics & Value Translation	13	27	2.1:1	Practitioner-led — financial translation layer in GL
MT4.5	Collaboration, Stakeholder Engagement & Communication	12	3	0.3:1	Academic-led — thin overall; collaborative architecture under-documented
MT4.6	Interdependency Management & PPM Tooling	2	3	1.5:1	Thin in both — genuine knowledge gap across WL and GL

5.2 PART A: THE PROBLEM LANDSCAPE

Part A sets out the problem landscape. Section 5.2.1 interprets the rationale for APM (RQ1) and Section 5.2.2 the consequences of its absence (RQ2), drawing on Sections 4.3 and 4.4. Reading together, the two sections suggest that portfolio governance may be a prerequisite for strategic coherence at scale and not overhead layered onto Agile delivery. The interpretive claims should be read against the coded evidence base and not as independent assertions.^P

5.2.1 The Strategic Imperative: Why Large-Scale Agile Organisations Need APM (RQ1)

The RQ1 themes are divided by literature type as mentioned in (**Table 5-2**). MT1.1 and MT1.5 are WL-led, MT1.2 and MT1.3 are GL-led, and MT1.4 falls between the two. This section considers what that division indicates about the rationale for APM.

The aggregate picture of RQ1 is one of complementary specialisation. Academic literature has concentrated on the structural and institutional dimensions of the APM rationale because these lend themselves to theory-building that is governance design, institutional authority and strategic alignment mechanisms (Aghajani et al., 2023; Stettina & Hörz, 2015). Practitioner literature has concentrated on operational dimensions because these are what practitioners actually encounter when building governance systems such as how to run a portfolio Kanban board, how to structure an OKR review cycle and how to manage capacity at programme level (Knaster & Leffingwell, 2020; Leffingwell, 2019; Project Management Institute, 2017). The result is not a single unified body of knowledge but two bodies of knowledge describing the same phenomenon from different positions. One of the contributions of this review is making that complementary architecture visible, showing both the areas of convergence and the disciplinary division of labour that characterises the current state of APM rationale knowledge.

White literature frames the need for APM as a structural governance problem. Portfolios connect organisational strategy to investment decisions, and without an effective connection mechanism misalignment becomes the default outcome and not the exception (Barclay & Osei-Bryson, 2010; Marnewick & Labuschagne, 2011; Miterev et al., 2017). Stettina and Hörz (2015) characterise the primary function of portfolio management as linking "organisational strategy to the distribution of resources across projects in the portfolio", and Aghajani et al. (2023) document how strategic misalignment accrues when portfolio governance is absent. Grey literature starts from operational urgency: investment decisions made without cross-portfolio awareness, teams working at capacity on initiatives that no longer reflect business priorities, and value streams whose direction has drifted from what the business intended (Knaster & Leffingwell, 2020). Leffingwell (2019) treats the annual planning cycle as itself a governance failure mode. The two framings are complementary. WL supplies the conceptual account of why misalignment occurs, and GL supplies evidence of what it looks like in practice. MT1.1 (Portfolio Value Realisation Through Strategic Alignment) shows the clearest convergence between the streams, with a GL:WL ratio of 0.5, although the WL majority means that the academic account carries more of the weight in this theme.

The divergence between WL and GL widens when the review moves from rationale to mechanism. MT1.2 (Empirical Adaptive Governance) is the most GL-led theme in RQ1 (2.8:1), and MT1.3 (Flow Optimisation and Capacity Governance) leans the same way (1.4:1). In both, WL establishes the theoretical case for adaptive mechanisms and GL describes how they work: how rolling-wave planning cycles run, what a portfolio-level OKR review involves, and what distinguishes a portfolio Kanban board that changes decisions from one that only produces reports (Marnewick & Labuschagne, 2011; Martinsuo et al., 2022). Knaster and Leffingwell (2020) describe rolling-wave PI planning and portfolio Kanban in implementation detail, and Leffingwell (2019) provides the OKR-based portfolio alignment model. One reading is that practitioners have documented these mechanisms ahead of formal academic study, in which case the practitioner literature may currently be the more detailed guide to operational design. The ratios alone do not establish this, because search design and the concentration of extracts in a few sources also affect them (Section 4.2).

MT1.4 (Collaborative and Behavioural Foundations of APM) indicates that the need for APM is not reducible to structural or strategic arguments alone. Portfolio governance requires people from finance, strategy, delivery and product to engage in a shared conversation about investment priorities. WL documents this requirement in terms of boundary-spanning roles, shared mental models and collaborative decision architectures (Bechtel et al., 2022; Svejvig et al., 2025), and Aghajani et al. (2023) find cross-functional alignment to be a consistent predictor of APM success. GL describes the cadences and forums that structure the conversation, such as SAFe's planning event and the participation of Business Owners (Knaster & Leffingwell, 2020; Leffingwell, 2019). Both streams treat the collaborative foundation as a precondition for effective portfolio governance, and mechanisms that are structurally sound but lack it may produce the appearance of alignment without its substance (Svejvig et al., 2025).

MT1.5 (Formal Governance Infrastructure and PPM Architecture) has no grey literature contribution as all 37 of its extracts come from white literature, and it is the only WL-only theme in the review. WL treats PMO structures, governance bodies with defined mandates and standardised procedural architecture as part of the rationale for APM, as institutional conditions that give portfolio governance its authority (Aghajani et al., 2023; Stettina & Hörz, 2015). Practitioner sources treat these structures as design questions for implementation and not as part of the case for adoption (Knaster & Leffingwell, 2020; Leffingwell, 2019). WL defines the governance requirements for APM to function, and GL addresses how to implement them. The division may reflect what each community writes about, and the GL search design may also contribute (Section 4.2).

RQ1 Summary

Research Question 1 asked why large-scale organisations need a dedicated portfolio management layer. Drawing on 369 coded extracts across five merged themes (MT1.1–MT1.5), the analysis produced a layered, multi-dimensional answer.

Large-scale Agile organisations need APM because strategy-portfolio misalignment is a structural governance failure, not an incidental one. APM addresses five interdependent governance needs: strategic value translation, adaptive re-prioritisation, flow and capacity governance, collaborative behavioural foundations, and formal institutional architecture. Academic and practitioner literature converge on the core rationale but approach it from different angles. WL diagnoses the structural problem and GL describes the operational consequences and the mechanisms that address them. Because the five

dimensions are interdependent, organisations that address only some of them are likely to achieve alignment in one area while creating new failure modes in others.

All 41 sources contribute to RQ1, and the largest single contributor (GL-3-26) supplies 32 of the 369 extracts (9%), so the rationale themes do not depend on one source. MT1.5 is narrower: 11 WL sources contribute and one of them (Scopus-119) supplies 11 of the 37 extracts. The review maps what the literature argues and does not test outcomes (Section 5.4), so the rationale is better described as well supported in the literature than as demonstrated. MT1.2 and MT1.3 are GL-led, and the search design may partly explain this (Section 4.2).

5.2.2 The Cost of Absence: What challenges do large-scale organisations face in the absence of APM? (RQ2)

RQ2 yielded two merged themes, MT2.1 (Strategic Drift and Value Leakage) and MT2.2 (Structural Fragmentation and Coordination Failure), which together describe a compounding failure dynamic and not a list of independent problems. Unlike RQ1, WL and GL engage with the failure question at broadly comparable rates, which suggests that the consequences of absent portfolio governance are visible to both researchers and practitioners.

The white literature provides the theoretical grounding for understanding the structural dynamics and theoretical foundations of governance breakdown. The practitioner-led grey literature draws on lived experience to document what governance failure looks like from inside an organisation. MT2.1 (Strategic Drift and Value Leakage) concerns what happens to an organisation's strategic direction when portfolio governance is absent. The failure appears to be cumulative and not sudden: small, individually justifiable investment decisions add up to large strategic misalignments. Vähäniitty et al. (2010), drawing on empirical study of software portfolio management failures, classify the resulting decisions as late, toothless, or misguided and uninformed. The same typology appears in independent WL sources including Aghajani et al. (2023), which suggests a structural pattern tied to absent portfolio governance and not an artefact of one study's context.

There is a timing problem in MT2.1 that the coding categories do not capture. Strategic drift does not trigger a diagnostic response at any specific moment, because no portfolio-level instrument measures it as it accumulates. Project-level governance measures project health and programme-level governance measures programme delivery, and neither shows cumulative strategic misalignment. An organisation can have green project dashboards and functioning programme governance while its portfolio diverges

from what its strategy requires. Absent portfolio governance may therefore be more consequential than absent project governance, because it leaves a problem that neither team-level nor programme-level governance can detect (Hoffmann et al., 2020; Sweetman et al., 2014; Vähäniitty et al., 2010). (Rosenberger & Struzl, 2017) add that classic governance metrics are structurally unsuited to revealing Agile portfolio drift, and Barclay and Osei-Bryson (2010) show that the aggregate risk is invisible to project-level management.

The Agile-specific consequence documented in MT2.1(Governance Breakdown, Strategic Drift & Value Leakage) deserves particular attention. Multiple sources including Aghajani et al. (2023), Vähäniitty et al. (2010), and Knaster and Leffingwell (2020) identify that poor governance at portfolio level does not merely fail to add value. It actively subtracts value from the team-level Agile practices that organisations have invested in developing. Scopus-128 (Aghajani et al., 2023) states this directly “failure to synchronise PPM with Agile project delivery will compromise the ability of Agile teams to react rapidly to changes in project requirements”. This reframes the governance question entirely. Portfolio governance is not overhead that Agile-mature organisations need to justify. It may be a prerequisite for realising the value of team-level agility at organisational scale, because the evidence suggests that agility at team level does not substitute for coherence at portfolio level.

MT2.2 (Structural Fragmentation and Coordination Failure) shifts the focus from strategic direction to internal structure. Teams and functions that pursue locally rational goals can produce collectively irrational outcomes at organisational level (Hoffmann et al., 2020; Stettina & Hörz, 2015). WL accounts describe methodological fragmentation and institutional process incompatibility. GL accounts add operational detail: resource instability, coordination breakdowns at team and programme boundaries, and technical debt that stays invisible without portfolio-level visibility (Stettina & Hörz, 2015; Vazifeh-Noshafagh et al., 2022). The Agile-specific feature of this challenge is that team-level adoption proceeds at different rates and in different forms, so that Scrum teams, SAFe programmes and business units without Agile practices sit within one governance structure (Stettina & Hörz, 2015; Vazifeh-Noshafagh et al., 2022). No single governance mechanism serves all of these delivery modes equally, so portfolio governance bodies may have to choose between standardising, which suppresses legitimate variation, and accommodating variation, which increases governance complexity. Neither option is cost-free. The MT2.2 evidence documents this dilemma as a predictable structural consequence of Agile adoption in large organisations and does not resolve it (Stettina & Hörz, 2015).

A measurement dimension runs through both MT2.1(Governance Breakdown, Strategic Drift & Value Leakage) and MT2.2(Structural Fragmentation and Coordination Failure). Several sources document what might be called measurement blindness which means the use of governance metrics (budget-to-plan, schedule variance, resource utilisation) that are structurally mismatched to Agile delivery. EBSCO-19 (Rosenberger & Struzl, 2017) describe these classic metrics as structurally unsuited to Agile portfolios, creating a condition in which an organisation can hold all the right governance meetings and produce all the right governance reports while having none of the right information for genuinely strategic decisions. The problem runs deeper than a technical mismatch, however. Budget-to-plan measures commitment adherence rather than value delivery. The teams optimising for this metric have an incentive to avoid the pivots and re-prioritisation that adaptive delivery requires. Schedule variance penalises the discovery of wrong assumptions, which is exactly the kind of discovery that empirical governance mechanisms are designed to surface early. Resource utilisation metrics create pressure toward full capacity usage, which in lean portfolio management terms produces the opposite of effective throughput governance, since high utilisation rates at the individual and team level reduce the slack that enables rapid reprioritisation. These are not measurement imprecisions. They are incentive structures that work against the adaptive behaviours effective APM requires.

These failure modes are also diagnostic. MT2.1 is what the empirical steering mechanisms of MT4.1 are designed to prevent, by replacing annual commitment cycles with rolling-wave recalibration against current business outcomes, and MT2.2 is what the governance architecture of MT4.2 to MT4.6 is designed to address, by establishing portfolio-level visibility, mandate and coordination routines. Absent portfolio governance does not leave an organisation in a neutral condition. It leaves it in a progressively deteriorating state that it may be unable to diagnose from within, because a failing project is usually visible at project level whereas a failing portfolio is typically visible only from outside it or after the effects have become consequential. The framework in Section 5.4 uses the RQ2 failure modes as diagnostic criteria (Components 1 and 2 of Figure 5-3) that could be assessed before governance design begins, since starting with design risks building infrastructure for problems an organisation does not have.

RQ2 Summary

The absence of APM produces two compounding failure modes: strategic drift and value leakage (MT2.1), and structural fragmentation and coordination failure (MT2.2). These failure modes accumulate rather than self-correct, and absent portfolio governance actively undermines team-level Agile rather than simply failing to add value. The classic

governance metrics most organisations rely on are not merely imprecise for Agile portfolios. They mis-incentivise adaptive behaviour and actively reinforce the failure modes they are supposed to manage.

RQ2 rests on a narrower base than RQ1: 28 of the 41 sources contribute (15 WL, 13 GL), and one source (GL-3-26) supplies 24 of the 128 extracts (19%). MT2.1 draws on 14 sources, six WL and eight GL. Section 2.5 notes that the absence of portfolio management appears mainly as a side finding in the empirical studies, so the account of absence may rely more on problems documented during adoption, and on practitioner experience, than on direct comparison of organisations with and without APM. The failure modes are better read as recurrent patterns reported in the literature than as measured consequences.

5.3 PART B: THE GOVERNANCE RESPONSE

Part B examines the governance response: the barriers to adoption (RQ3, Section 5.3.1) and what effective APM looks like in practice (RQ4, Sections 5.3.2 to 5.3.8). Section 5.4 then synthesises the four research questions into a conceptual framework.

5.3.1 Why APM Is Hard to Implement: What are the barriers that stop organisations from implementing PPM? (RQ3)

RQ3 asks why, given the case for portfolio management (RQ1) and the cost of its absence (RQ2), so many large-scale organisations struggle to implement it. The 119 coded extracts across three merged themes (MT3.1–MT3.3) indicate that the barriers are not primarily technical but human, structural and political, and that they interact (Hoffmann et al., 2020; Stettina & Hörz, 2015).

The three merged themes describe barriers that are independent in name only. MT3.1 (Socio-Political and Cultural Resistance) documents the human and political dimensions. Portfolio governance requires investment decisions to be made transparently, on evidence, and open to challenge, so some people who hold authority through opacity and political influence may stand to lose power. WL frames this as institutional inertia and stakeholder resistance (Dias & Tenera, 2023; Hoffmann et al., 2020). GL is more direct, describing governance as culture shift as the most consistently cited barrier and management buy-in as the primary point of failure in implementation programmes (Project Management Institute, 2017). Because portfolio governance changes who can see, and therefore who can redirect or block, investment decisions (Hoffmann et al., 2020; Reyck et al., 2005), practitioner sources describe the change as a redistribution of power that executive leadership must be willing to sustain (Project Management Institute,

2017). MT3.1 may therefore be better treated as a structural obstacle than as a change management concern, and one that governance frameworks may underestimate.

MT3.2 (Structural Complexity and Scalability Barriers) addresses the architectural challenges of portfolio governance in large, complex organisations. A central tension is strategic ambidexterity, the need to manage stable, predictable elements of the portfolio alongside fluid Agile delivery streams with mechanisms that must serve both (Hoffmann et al., 2020). GL evidence adds methodological fragmentation between Agile and non-Agile streams, incompatibility between existing governance structures and cadence-based decision-making, and the difficulty of scaling mechanisms that work at programme level to portfolio scale (Project Management Institute, 2017). Mechanisms that work at programme level often fail at portfolio scale (Sweetman et al., 2014), not necessarily because they are poorly designed but because coordination requirements may grow faster than portfolio size. For example, a weekly standup and shared dashboard may suffice for five delivery streams but not for twenty across four business units. Institutional theory offers an explanation of why governance mechanisms that are both stable and flexible are hard to build (DiMaggio & Powell, 1983). The WL evidence suggests that most existing frameworks have not been tested in organisations large or complex enough to expose their scaling limits (Hoffmann et al., 2020; Sweetman et al., 2014).

MT3.3 (Capability Deficits and Resource Constraints) documents the knowledge and capability gaps that prevent organisations from implementing governance designs they may theoretically understand. This theme is WL-dominant (GL:WL ratio = 0.2:1 by extracts; 3 GL and 11 WL sources contribute), reflecting that academic researchers have studied the capability gap question more systematically than practitioners have documented it. Initial codes include portfolio management capability gap, role and identity disruption, perceived implementation barriers, and reactive resource instability (Hoffmann et al., 2020; Stettina & Hörz, 2015). The pattern suggests that the barrier is not a lack of tools or methodologies but a deficit in organisational capability to sustain portfolio governance even when it is implemented (Müller et al., 2025; Reyck et al., 2005).

What makes the MT3.1-MT3.3 interaction particularly difficult to manage is that the standard organisational response to each barrier can inadvertently strengthen the others. Buying in external consultants to address capability deficits (MT3.3) can amplify political resistance (MT3.1) if the consultants are perceived as bringing an agenda that threatens established authority structures. Redesigning governance processes to manage structural complexity (MT3.2) can create implementation delays that reduce

leadership patience and erode the organisational commitment needed to overcome MT3.1 (Socio-Political and Cultural Resistance). Organisations that have navigated these dynamics successfully tend to name the political dimensions explicitly at the start of an APM programme rather than treating them as background concerns (Project Management Institute, 2017). The GL evidence shows consistently that transparency about the power implications of governance change is more effective than pretending those implications do not exist.

Figure 5-1 maps the three barrier categories identified across the RQ3 evidence base and, critically, their interactions. The barriers do not sit independently but they compound. This compounding effect is the central finding this figure is designed to communicate.

The relationship between MT3.1(Socio-Political and Cultural Resistance) and MT3.2(Structural Complexity and Scalability Barriers) illustrates this most directly. Political resistance makes it harder to secure the sustained leadership commitment needed to address structural complexity. But the reverse is equally true that structural complexity creates conditions of opacity in which political actors can obstruct change without accountability. Each barrier actively sustains the other. MT3.3(Capability Deficits and Resource Constraints) follows the same logic that the capability deficits persist partly because political resistance blocks the investment needed to resolve them, and resource instability makes structural reform feel premature when the skills to execute it don't yet exist(Hoffmann et al., 2020).

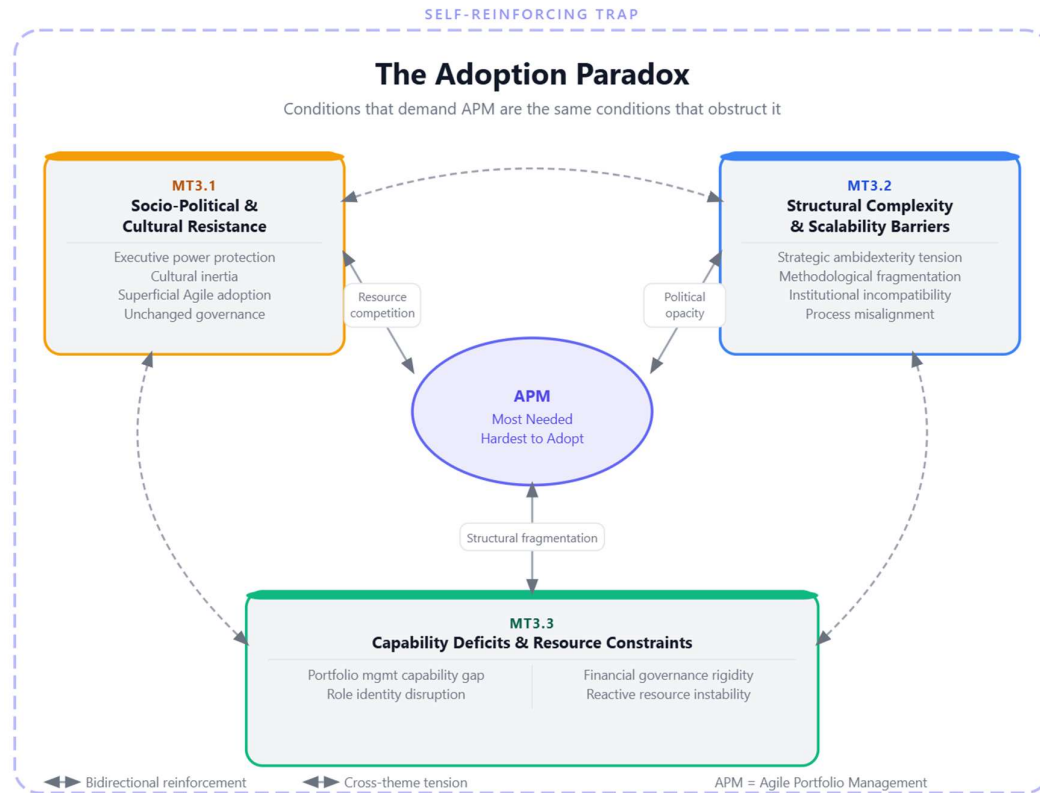
The diagram's centre node captures what this review terms the adoption paradox which is an analytical observation that draws on the broader paradox theory literature (Smith & Lewis, 2011) but, in the sources reviewed here, has not been articulated for the APM domain specifically. The environmental conditions that make APM most necessary are intense resource competition, politically distorted prioritisation and structural fragmentation and these are precisely the conditions that make adoption hardest. This is not a coincidence. It is the mechanism by which APM implementations fail.

The practical implication follows directly from this. APM adoption is an organisational transformation, not a design exercise. Getting the governance model right is the easier part. Embedding it against existing power structures, institutional inertia, and entrenched capability gaps is the harder part and the part which literature consistently shows organisations underestimate. The GL sources are particularly instructive here as the failure in the practitioner record occurs not at the design stage but at the change management stage. Organisations understood what good portfolio governance looked

like. They couldn't overcome the political and cultural conditions that prevented them from establishing it (Dias & Tenera, 2023; Project Management Institute, 2017).

Figure 5-1

The Adoption Paradox: three barrier categories and their compounding interactions (MT3.1, MT3.2, MT3.3).



Note: The environmental conditions that make APM most necessary tend to be the same conditions that make each barrier most difficult to overcome.

The bridge from RQ3 to RQ4 that is from the barrier landscape to the governance architecture is the question that the adoption paradox makes hardest to answer: how do organisations move forward when the barriers are most intense precisely in the organisations that need the governance most? The review does not yield a definitive answer, but a pattern visible across GL sources is instructive. Successful APM adoptions tend to begin not with comprehensive governance design but with targeted visibility improvements. Establishing portfolio Kanban or outcome tracking in a single programme area, building a track record of evidence-based decision-making in a limited domain, and using that track record to progressively expand both the governance infrastructure and the organisational credibility needed to sustain it (Knaster & Leffingwell, 2020; Project Management Institute, 2017). This staged approach is implicitly a response to the adoption paradox. It reduces the political surface area of the governance intervention at any given time, while building the coalition and capability needed to extend it. The

governance architecture described in Section 5.3.8 should therefore be understood as a mature-state target rather than an initial implementation blueprint (Knaster & Leffingwell, 2020).

The RQ3 evidence shows a disciplinary asymmetry that matters. GL sources are considerably more specific and direct about the political and cultural dimensions of adoption resistance (MT3.1 GL:WL ratio = 3.4:1). The academic literature tends to describe resistance at a structural level rather than at the personal and political level that practitioner accounts make visible. This asymmetry likely reflects the natural tendency of academic research toward abstraction and the natural tendency of practitioner accounts toward operational specificity. Both levels of analysis are necessary for a full understanding of the adoption barrier landscape.

RQ3 Summary

APM adoption is blocked by three categories of barriers namely socio-political and cultural resistance, structural complexity and scalability challenges, and capability deficits that interact and amplify each other. The core dynamic is an adoption paradox that explains the conditions that make APM most necessary are the same ones that make it hardest to establish. Successful adoptions tend to use staged, low-surface-area implementation approaches rather than comprehensive governance redesigns. The governance architecture of RQ4 is best understood as a mature-state target, not an initial implementation blueprint (Knaster & Leffingwell, 2020; *The Disciplined Agile® (DA™) Tool Kit*, n.d.).

Twenty-eight sources (16 WL, 12 GL) contribute to RQ3, and the largest contributor (SCOPUS-RQ2-13) supplies 17 of the 119 extracts (14%). MT3.3 has only four GL extracts and MT3.1 draws on only five WL sources, so each of these barriers is documented mainly from one stream. Section 2.5 notes that the empirical studies show what can occur and not how often, and the same limit applies here: the review cannot show how common each barrier is. The interactions among the barriers in Figure 5-1, and the adoption paradox they illustrate, are an interpretation of the pattern across themes and not a relationship reported by any one source.

5.3.2 Governance in Practice: What Effective APM Actually Looks Like (RQ4)

RQ4 yielded 307 coded extracts across six merged themes (MT4.1–MT4.6) and has the highest GL proportion of any research question (GL:WL 1.6:1, rising to 4.5:1 for MT4.1). This may indicate that organisations that have built APM governance are among those

documenting it, and it is consistent with practice being ahead of formal academic research on this question, although the ratio alone does not establish this (Section 4.2).

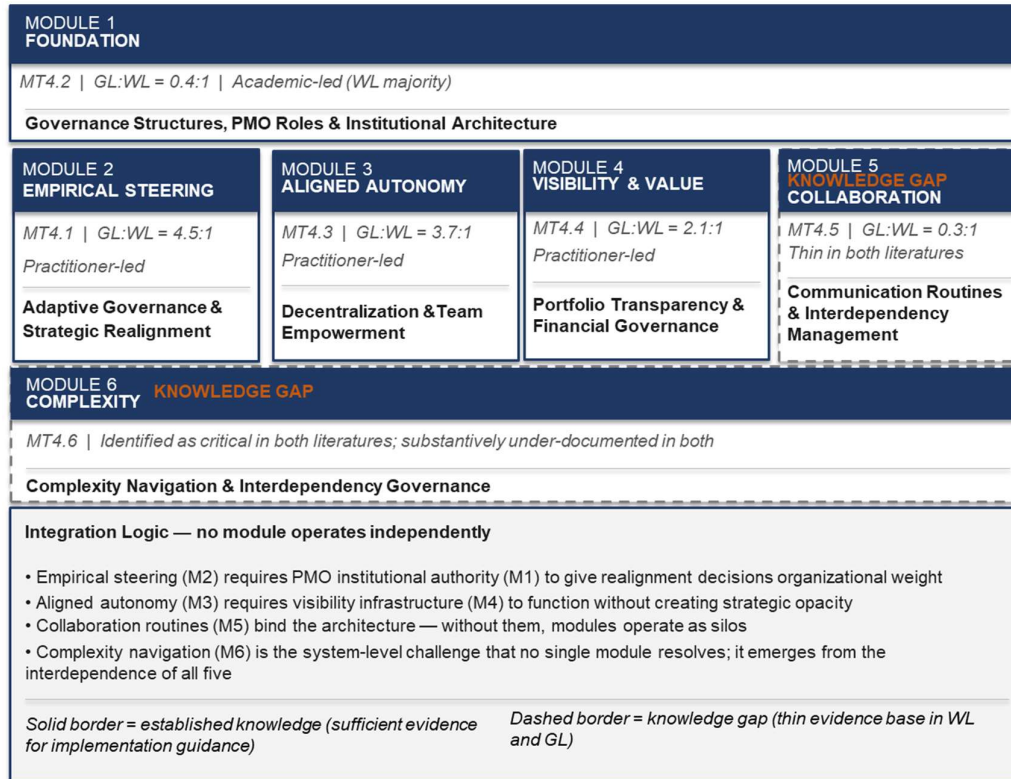
The six RQ4 merged themes do not describe independent governance practices that can be adopted separately. They describe an integrated governance architecture in which distinct mechanisms interact and depend on each other to produce outcomes that none could achieve alone. **Figure 5-2** presents this architecture as a modular tile diagram. Each of the six governance modules occupies a coloured tile. The layout of the tiles is intentional and carries analytical meaning.

The **Figure 5-2** is organised in four rows. Module 1 (Foundation, MT4.2) spans the top row because it is the institutional base: without PMO mandate and governance authority, the steering, execution and visibility mechanisms remain advisory and not binding. Modules 2 (Steering, MT4.1) and 3 (Execution, MT4.3) sit side by side as complementary mechanisms, as do Modules 4 (Visibility, MT4.4) and 5 (Comms, MT4.5), where visibility generates the performance information that communication distributes across organisational levels. Module 6 (Complexity, MT4.6) spans the bottom row because interdependency management is a whole-architecture concern. The Integration Logic banner names the dependency each module has on the others.

Two visual signals appear in the diagram. Solid borders indicate established governance knowledge, where the evidence base is sufficient to support implementation guidance. Dashed borders on Modules 5 and 6 indicate genuine knowledge gaps. Both MT4.5(Cross-Level Collaboration and Stakeholder Communication) and MT4.6(Complexity Navigation and Interdependency Governance) are thin across both WL and GL, meaning the architecture identifies these as necessary mechanisms but the field has not yet produced validated operational guidance for them.

The modular architecture acknowledges prior empirical work by Stettina & Hörz, 2015, who characterise APM as a multi-level practice spanning strategic, programme, and operational layers, and by (Knaster & Leffingwell, 2020), whose SAFe Lean Portfolio Management model describes a comparable set of portfolio governance functions. The present architecture extends both by incorporating the WL/GL knowledge asymmetry as a structural feature of the diagram itself, making visible not just what effective APM governance requires but where the evidence for each requirement currently sits.

Figure 5-2
Integrated APM governance architecture: six interdependent mechanisms (RQ4)



Note: Mechanisms are organised by function layer. Dashed borders on MT4.5 and MT4.6 indicate knowledge gaps. Integration logic column shows how each mechanism depends on others.

5.3.3 Empirical Steering and Strategic Realignment (MT4.1)

The most fundamental shift in Agile portfolio governance is a change in how plans are understood. In traditional portfolio governance, a plan is a commitment. Once the plan is approved, it is executed, and any deviation from the plan requires justification. In empirical portfolio governance, a plan is a hypothesis which is the best current estimate of where to invest, held with confidence but open to revision as evidence arrives (Knaster & Leffingwell, 2020; Schwaber & Beedle, 2002). MT4.1 documents the specific mechanisms through which this shift is operationalised.

MT4.1 has 110 coded extracts (GL n=90; WL n=20), a GL:WL ratio of 4.5:1. This is the highest GL share among the themes drawn from both streams. Forty-seven of the 110 extracts come from one source (GL-2-02), so the pattern may partly reflect that source. GL evidence describes in operational detail the practices that constitute empirical steering at portfolio scale. The portfolio Kanban boards act as a continuous visibility mechanism. Rolling-wave planning cycles replace annual commitment with quarterly recalibration. OKR-based investment framing connects team-level delivery to portfolio-level outcome and the shift from tracking deliverables to tracking value. Academic

literature provides the theoretical framing for why adaptive governance is needed. Practitioner literature provides the operational architecture for how it works. This asymmetry may reflect a rigour-relevance gap in the APM domain. The concept of rigour-relevance gap has been studied in detail by (Van De Ven & Johnson, 2006). The GL sources suggest that practitioners developed and refined these mechanisms through implementation experience ahead of formal academic documentation.

The OKR-based investment governance documented in MT4.1(Empirical Steering and Strategic Realignment) represents a significant reframing of how portfolio decisions connect to organisational strategy. Under traditional portfolio governance, the connection between strategy and investment is made through annual planning where business units translate strategy into project proposals, finance allocates budgets, and the portfolio is defined by the sum of those allocations. Under OKR-based portfolio governance, the connection is made through continuous alignment so the portfolio-level OKRs establish the outcomes the business is trying to achieve in the near term, and investment decisions are evaluated against their contribution to those outcomes on a rolling basis. This reframing changes the temporal structure of governance accountability. Annual budget commitments lock portfolio direction for twelve months. OKR-based portfolio alignment creates accountability checkpoints every quarter or six weeks, allowing the portfolio to incorporate newly discovered opportunities and to recognise when prior investments are not delivering expected value. Knaster & Leffingwell, 2020 characterises this as the transition from a project-funding model to a value-stream funding model, a governance shift with substantial implications for how financial governance, PMO authority, and delivery cadences are all structured.

5.3.4 Institutional Governance Architecture and PMO Design (MT4.2)

MT4.2 is the only RQ4 theme with a clear WL majority (WL n=60, GL n=25, ratio 0.4:1). This reversal is not coincidental. The formal architecture of portfolio governance where the PMO is placed as a centre of institutional authority, governance bodies with defined mandates, the accountability structures that give portfolio decisions organisational standing is a domain that management and IS researchers have studied systematically for longer than practitioners have been documenting it (Marnewick & Labuschagne, 2011; Stettina & Hörz, 2015). The academic evidence characterises PMO structures not merely as administrative convenience but as the institutional mechanism through which portfolio governance acquires the authority to make decisions that override project-level competing interests (Aubry et al., 2009; Hobbs & Aubry, 2007). Without this institutional standing, portfolio governance remains advisory, which in practice means it can be

overridden whenever it conflicts with politically more powerful interests (Marnewick & Labuschagne, 2011).

The tension between PMO authority and Agile team autonomy is the central governance design challenge that MT4.2 must navigate. Traditional PMO models acquire authority by controlling information flows such as project status reports, resource utilisation data, stage-gate decisions and so on and then using that information asymmetry to exercise governance authority (Hobbs & Aubry, 2007; Project Management Institute, 2017). In Agile portfolio governance, this model is both unnecessary and counterproductive. Teams produce high-frequency, high-transparency delivery information as a natural by-product of their ways of working, which makes information control an implausible basis for PMO authority. The academic evidence in MT4.2 describes PMO authority in Agile contexts as resting instead on investment mandate (Stettina & Hörz, 2015). This provides the authority to PMO to make and enforce portfolio-level investment decisions that individual teams and programmes do not have the visibility or legitimacy to make independently. This mandate-based authority model requires fundamentally different PMO capabilities than the information-control model such as political standing with executive leadership, economic literacy about value delivery, and the ability to facilitate portfolio-level investment conversations rather than police project-level compliance (Knaster & Leffingwell, 2020; Stettina & Hörz, 2015). The WL dominance in MT4.2 is therefore significant not just as a bibliometric observation but as an analytical signal that the institutional underpinnings of Agile portfolio governance remain better theorised than implemented.

What the more advanced GL sources describe is a reconstitution of PMO authority around enabling functions rather than controlling ones. Rather than accumulating authority through information gatekeeping, the enabling PMO model builds authority by providing shared services that teams genuinely need such as capacity data, portfolio-level metrics, dependency mapping, and facilitation of the investment governance forums at which reallocation decisions are made (Aubry et al., 2009; Hobbs & Aubry, 2007). This requires the PMO to develop new capabilities. Facilitation, data analytics, and the ability to translate between Agile delivery language and financial governance language replace the stage-gate compliance skills that defined traditional PMO work. GL sources describe this as a difficult transition to lead, because it requires existing PMO staff to relinquish the authority instruments that defined their roles while simultaneously developing capability in areas where they may have limited experience (Knaster & Leffingwell, 2020; Leffingwell, 2019). Academic literature has documented the enabling

PMO concept at a structural level (Stettina & Hörz, 2015) but the operational mechanics of the transition from controlling to enabling models remain undertheorized.

5.3.5 Decentralised Execution with Aligned Autonomy (MT4.3)

The tension between portfolio-level governance and team-level autonomy is one of the central governance design challenges in large-scale Agile organisations. MT4.3 documents the specific mechanisms through which effective APM governance manages this tension, not by resolving it, but by structuring a form of aligned autonomy in which teams have genuine decision-making authority within boundaries set by portfolio governance. With a GL:WL ratio of 3.7:1, this theme is strongly GL-dominated, consistent with the broader pattern that the operational mechanics of governance are primarily documented in practitioner sources. GL evidence describes the governance design principles that enable aligned autonomy. Clearly defined portfolio-level guardrails within which teams can self-organise, decentralised investment decisions within lean budget boundaries, and the replacement of centralised feature roadmaps with team-level OKR are the commitments that connect to portfolio outcomes without prescribing delivery specifics (Knaster & Leffingwell, 2020).

The shift from project-based to value stream funding is the specific governance design change in MT4.3 with the largest downstream implications. Under project-based funding, teams receive annual budgets attached to defined project scopes. Any change in scope requires a governance event that interrupts delivery and absorbs management capacity. Under value stream funding, teams receive a capacity allocation within lean budget guardrails and can self-organise delivery within that allocation without triggering governance events for routine reprioritisation. This moves governance overhead away from delivery-time decisions about what to build next and toward portfolio-time decisions about the right investment level for each value stream. GL sources describe this as one of the most consequential governance design changes available to large organisations, specifically because it removes the incentive structure that currently makes adaptive delivery politically costly in project-funded contexts (Knaster & Leffingwell, 2020; Leffingwell, 2019).

The practical mechanism that effective APM governance uses to manage the autonomy-alignment tension is what GL sources variously call guardrails, boundaries, or policy constraints (Knaster & Leffingwell, 2020; Leffingwell, 2019). Guardrails define the space within which teams can make decisions without governance review, while signalling the conditions under which a decision must be escalated. The governance design challenge is calibrating that scope. If it is too narrow then governance overhead consumes the

agility the funding model was meant to protect. If it is too wide then teams make locally rational decisions that produce the cross-portfolio fragmentation documented in MT2.2. What the GL evidence reveals is that guardrail calibration is not a one-time design decision. It is an ongoing governance practice. As the portfolio's understanding of its value streams matures, and as teams build track records of responsible autonomous decision-making, the boundaries can be progressively widened (Knaster & Leffingwell, 2020). This incremental expansion of autonomy in response to demonstrated capability differs materially from the binary choice between centralised and decentralised governance that much of the WL literature presents proves insufficient when the unit of analysis shifts from individual projects to portfolios of Agile programmes (Hoffmann et al., 2020; Stettina & Hörz, 2015).

5.3.6 Portfolio Transparency and Financial Governance (MT4.4)

Effective portfolio governance depends on visibility. MT4.4 documents the information architecture that makes this visibility possible, with particular emphasis on the financial governance mechanisms that translate between Agile delivery metrics and the business-value language that executive stakeholders require. A central finding is what this review terms the financial translation layer which is the governance capability to express IT investment decisions in business-outcome terms rather than project-delivery terms. Without this translation, portfolio governance operates on information that executive stakeholders cannot act on, because the metrics being tracked, including story points, velocity, and sprint completion rates, do not map onto the business questions that portfolio governance is supposed to answer. GL evidence, drawing heavily on lean portfolio management practice, describes the specific mechanisms of value-stream budgeting and outcome-based investment tracking that make the financial translation layer operational (Accelerating Business Value with SAFe® and Technology Business Management, 2020; *Accelerating Strategy Execution: Effective Portfolio, Program and Project Management*, n.d.).

The practical challenge of building this translation layer is not technical but political. The metrics that executive stakeholders are accustomed to receiving, including cost against budget, schedule performance, and resource utilisation, are familiar precisely because they were designed for the governance frameworks that preceded Agile adoption. Replacing them with outcome-based metrics requires that executive stakeholders accept a period of reduced metric familiarity in exchange for metrics that more accurately reflect value delivery. GL sources in MT4.4 document the specific challenge of building executive confidence in outcome metrics, particularly the translation between Agile delivery indicators and business performance indicators such as revenue contribution,

customer acquisition cost, and risk reduction that the financial translation layer must provide (Hassan, M. K., & Ilyas, M. A., 2014; *Is Your Governance Fit for Purpose?*, n.d.). This challenge connects MT4.4 directly back to the political resistance dynamics of MT3.1: resistance to new governance metrics is often framed as a technical concern when it is actually a political one.

Building the financial translation layer in practice also demands governance capability that combines technical understanding of Agile delivery with financial literacy and the organisational authority to sustain the translation conversation. GL sources note consistently that this combination is rare at the individual level and is more reliably built at the governance process level through shared reporting formats, translation artefacts, and governance cadences that force the value conversation to occur at regular intervals (Accelerating Business Value with SAFe® and Technology Business Management, 2020; *Accelerating Strategy Execution: Effective Portfolio, Program and Project Management*, n.d.). The large-enterprise Agile transformations documented in GL sources tend to have created dedicated portfolio management roles whose explicit function is maintaining this translation layer rather than managing delivery (Knaster & Leffingwell, 2020; Leffingwell, 2019). This is a distinct capability requirement from the PMO authority question in MT4.2 that even a well-structured PMO will struggle to sustain executive confidence in Agile investment decisions if it cannot translate delivery outcomes into the business-value language that executive investment conversations require. The two capabilities need to be co-present, and the evidence base suggests that organisations more often invest in PMO structural design than in the translation capability that gives structural authority its practical content (Accelerating Business Value with SAFe® and Technology Business Management, 2020; *Accelerating Strategy Execution: Effective Portfolio, Program and Project Management*, n.d.).

5.3.7 Collaboration, Communication Routines, and Interdependency Management (MT4.5 and MT4.6)

MT4.5 (n=15) and MT4.6 (n=5) are the thinnest themes in the review, and their thinness is analytically significant. MT4.5 covers collaboration routines and communication infrastructure with the regular cadences of cross-functional engagement through which portfolio governance maintains shared understanding across the organisation. Academic sources establish the principle that cross-level collaboration is essential for portfolio governance to function but do not provide a detailed account of what effective collaboration architecture looks like in practice (Aghajani et al., 2023; Stettina & Hörz, 2015). The GL sources are even thinner. MT4.6, covering interdependency management at portfolio scale, has only five coded extracts across both literatures. Both MT4.5 and

MT4.6 appear with dashed borders in Figure 2 to signal that they represent genuine knowledge gaps rather than settled governance knowledge. Collaboration infrastructure is the medium through which the other five governance mechanisms maintain coherence across organisational levels, and interdependency management at portfolio scale is one of the primary practical challenges that GL sources identify as under-documented in both the academic and practitioner literatures (Accelerating Business Value with SAFe® and Technology Business Management, 2020; Hoffmann et al., 2020). The thinness of these themes defines a specific research agenda, addressed in Section 5.7.

The GL evidence for MT4.5 is thin but consistent. What it describes is a layered cadence structure starting with team-level standups and iteration reviews to maintain local visibility; programme-level synchronisation events to create cross-team visibility within a value stream; and portfolio-level cadences to maintain cross-portfolio coherence, surfacing interdependencies that no individual team can see from its local position (Accelerating Business Value with SAFe® and Technology Business Management, 2020). The thinness of the evidence base does not mean organisations lack collaboration infrastructure. It means the portfolio-level layer of that infrastructure has gone largely undocumented, and the consequences of that gap are visible in the MT2.2 fragmentation findings.

MT4.6's five extracts are drawn entirely from GL sources, a pattern that mirrors the MT4.1 finding that practitioners have documented the problem in operational terms while academic researchers have not yet theorised it. What those GL sources describe is a recurring operational challenge that traditional project management methods handle poorly. In conventional portfolio management, dependencies between work packages are tracked within the project plan and managed through a project manager's authority to coordinate across boundaries (Hoffmann et al., 2020). In large-scale Agile portfolios, the equivalent boundary runs between autonomous teams working in parallel on interdependent value streams, and no single person has the authority or visibility to coordinate across all of them simultaneously (Knaster & Leffingwell, 2020). The mechanisms needed are not dependency tracking tools but dependency surfacing routines. Regular cross-team forums at which each team must articulate what its needs from others and what commitments it has made, with escalation paths to portfolio level when dependencies cannot be resolved locally (Knaster & Leffingwell, 2020). That validated mechanisms for this remain largely undocumented is one of the most actionable knowledge areas gap this review identifies.

5.3.8 The Integrated Governance Architecture

The six RQ4 themes, taken together, describe a layered and interdependent governance architecture rather than a menu of optional practices. Empirical steering (MT4.1) appears to depend on the institutional authority of a properly structured PMO (MT4.2) to give realignment decisions organisational weight. Decentralised aligned autonomy (MT4.3) appears to depend on the visibility mechanisms of MT4.4 to make the guardrails meaningful. Collaboration routines (MT4.5) are the medium through which the governance architecture maintains coherence across organisational levels. Interdependency management (MT4.6) is the safeguard that prevents the complexity of large portfolios from undermining the alignment that the other mechanisms create. No single mechanism can compensate for the absence of another, and implementing them piecemeal is unlikely to produce the outcomes that the full architecture would.

The integrated architecture of **Figure 5-2** is not a set of stable solutions. It is a set of active governance tensions that the architecture must continuously hold in productive balance. Four such tensions run across the RQ4 evidence base and represent the enduring design challenges of APM governance. The first is the centralisation-decentralisation tension where portfolio governance requires sufficient centralisation to maintain strategic coherence and cross-portfolio resource visibility (Stettina & Hörz, 2015) while preserving the team-level autonomy that makes Agile delivery effective (Knaster & Leffingwell, 2020). The second tension is the structure-adaptability tension in which governance mechanisms must provide enough structural stability to support planning horizons while remaining flexible enough to accommodate rolling-wave investment decisions and mid-cycle portfolio reconfiguration (Hoffmann et al., 2020). The third is the value-control tension: the shift from milestone-based to value-based portfolio reviews requires governance bodies to relinquish familiar control metrics in favour of outcome measures that are strategically meaningful but harder to standardise (Müller et al., 2025; Rosenberger & Struzl, 2017). The fourth is the speed-rigour tension: empirical steering creates pressure to make portfolio decisions at the pace of delivery cycles, while the institutional authority needed to act on those decisions calls for process rigour that tends to slow the response (Sweetman et al., 2014; Vazifeh-Noshafagh et al., 2022). The evidence suggests these four tensions are managed rather than resolved through governance design. The architecture of **Figure 5-2** is best understood as a system of mechanisms that holds these tensions in productive balance rather than eliminates them.

RQ4 Summary

Effective APM governance operates as an integrated architecture of six interdependent mechanisms across six functional layers **Figure 5-2**. For this study, practitioner sources

document the operational design of adaptive governance (GL:WL = 4.5:1 in MT4.1) and the financial translation layer (MT4.4) more often than academic sources do. MT4.5 and MT4.6 represent the thinnest areas of the evidence base and constitute genuine knowledge gaps warranting future research attention. The architecture should be understood as a mature-state target that organisations implementing APM for the first time will build toward it progressively.

RQ4 draws on 38 sources (21 WL, 17 GL) but is the most concentrated question: GL-2-02 supplies 59 of the 307 extracts (19%), including 47 of the 110 in MT4.1, and three sources supply 34%. In MT4.1, MT4.3 and MT4.4 a single source supplies between 29% and 43% of the extracts, and the GL accounts come mainly from large-enterprise contexts (Section 4.2). The architecture is therefore better read as a synthesis of documented practice in particular settings than as evidence that the six mechanisms work together as the integration logic proposes. As Section 5.6 notes, no longitudinal data tests whether the recommended mechanisms produce the outcomes described, so that proposal remains untested.

5.4 A Conceptual Framework for APM Governance in Large-Scale Agile Development

The findings across all four research questions, taken together, support a conceptual framework for APM governance in large-scale Agile development that integrates the diagnostic, barrier, and governance design dimensions into a unified account. The framework has four components, each corresponding to one of the research questions, organised around a diagnostic-prescriptive arc that moves from the case for APM through its failure modes and adoption barriers to its governance design principles. **Figure 5-3** presents the framework visually. The upper zone maps the three diagnostic findings from Part A which are why portfolio governance is needed (RQ1), what breaks in its absence (RQ2), and what resists its adoption (RQ3) and shows all three converging on a single governance architecture. The lower zone unfolds that architecture into the six interdependent modules shown in **Figure 5-2** with the two knowledge gaps marked explicitly.

Figure 5-3
Conceptual framework for APM governance in large-scale Agile development.



The diagram runs in two connected zones separated by a dotted boundary. In the upper zone, the three diagnostic blocks are not arranged in order of importance however, they are arranged to show convergence. Each arrives at a different facet of the same conclusion. RQ1 establishes the strategic case for portfolio governance. RQ2 shows the cost of its absence. RQ3 maps the forces that will resist its introduction. None of the three findings alone is sufficient to motivate the full governance response below, but taken together they make the case unavoidable. The converging arrows make this reasoning explicit rather than leaving it to inference.

Below the dotted boundary, the same six modules from **Figure 5-2** reappear. In the integrated figure, it is located within the diagnostic argument that justifies each one. Modules 1 through 4 carry solid borders, meaning both the academic and practitioner literatures provide sufficient evidence to support governance design in these areas. Modules 5 and 6 carry dashed borders. The dashed border on Module 5 (MT4.5, Cross-Level Collaboration and Stakeholder Communication) reflects a GL:WL ratio of 0.3:1, the

lowest among the RQ4 themes. Practitioners treat collaboration infrastructure as operational foundation that is something built and maintained rather than designed from scratch. Academic literature, by contrast, has barely documented how portfolio-level communication architectures are structured or what distinguishes effective from ineffective ones. Module 6 (MT4.6, Complexity Navigation and Interdependency Governance) carries a dashed border for a related reason that both literatures identify it as critical, but neither document it with depth. The dashed borders are not dismissals as they mark where the architecture is evidentially thinnest, and where future empirical work is most urgently needed.

The Integration Logic strip at the base of the lower zone carries over directly from **Figure 5-2**. Here it does additional work as it shows that the governance architecture is a system in which the adequacy of each module depends on the others being operational. Organisations that implement Module 3 (team autonomy) without Module 4 (portfolio visibility) will find that decentralisation produces local optimisation rather than portfolio coherence. Organisations that build the steering mechanisms of Module 2 without the institutional foundation of Module 1 produce information without consequences. This sequencing logic runs directly through the practitioner implications in Section 5.5.2.

As **Figure 5-3** shows, the framework is not prescriptive about specific governance designs. It describes the dimensions an account of APM governance may need to address and the relationships between them. Component 1 (Strategic Rationale, RQ1) establishes the conditions under which APM is necessary. The five rationale dimensions from MT1.1–MT1.5 together make the case for why team-level agility alone is insufficient for organisational coherence at scale (Aghajani et al., 2023; Stettina & Hörz, 2015). Component 2 (Failure Mode Diagnostic, RQ2) describes what happens when those conditions are present but APM is absent, providing evidence-based language for identifying governance failures and establishing the baseline against which any APM intervention should be evaluated. This is the diagnostic function that Section 5.3 pointed toward by locating the RQ2 failure modes inside the framework, the framework turns them from a catalogue of problems into a structured checklist that organisations can apply before governance design begins.

Component 3 (Adoption Landscape, RQ3) maps the barriers that organisations may need to address when moving from diagnosing failure modes to implementing governance. The adoption paradox visible in **Figure 5-1** is embedded here as a design constraint as organisations that treat APM adoption as a design exercise rather than an organisational transformation are likely to encounter the barrier dynamics of MT3.1-

MT3.3 without adequate preparation. Component 4 (Governance Architecture, RQ4) describes the integrated set of governance mechanisms whose effectiveness depends on their interaction, as mapped in **Figure 5-3**.

The framework presented in **Figure 5-3** is a synthesis grounded in the findings of this review. It does not replicate a prior model, but its structure has identifiable intellectual antecedents that should be acknowledged. The multi-component framework design also draws on the hierarchical structure used in Antil's (2023) doctoral thesis at Auckland University of Technology, which organises its conceptual framework around portfolio, domain, and team decision-making levels within scaled Agile development (Antil, 2023). The structural logic of separating analytical dimensions by governance layer, rather than presenting an undifferentiated model, informed the present framework's component architecture

The diagnostic-prescriptive arc connecting the four components is the framework's central contribution. Among the frameworks discussed here, none combines the diagnostic, barrier and governance elements described below. Existing frameworks, including SAFe's Lean Portfolio Management (Knaster & Leffingwell, 2020), PMI's Disciplined Agile governance model (*The Disciplined Agile® (DATM) Tool Kit*, n.d.), and the empirical frameworks of Stettina and Hörz (2015) and Aghajani et al. (2023), address aspects of the governance design question (Component 4) in substantial detail (Aghajani et al., 2023; Stettina & Hörz, 2015). The present framework differs from these accounts in three ways. First, purpose: Section 2.4 describes SAFe and Disciplined Agile as governance designs offered by their authors, whereas the present framework is a synthesis of reported evidence and is not a design to be adopted. Second, scope: Stettina and Hörz (2015) study governance practice empirically and, with the other empirical studies in Section 2.5, locate the obstacles in funding, leadership and resistance and not in knowledge of the frameworks, and Aghajani et al. (2023) note that research on APM governance has not grown as fast as the frameworks used in industry (Section 2.4). The present framework places the rationale (Component 1), the failure modes (Component 2) and the adoption barriers (Component 3) alongside governance design (Component 4) in one structure. Third, evidence: each component records which literature stream supports it and where the evidence is thin. These differences rest on how the frameworks are characterised in Chapter 2. The review did not compare the framework documents component by component, so SAFe or Disciplined Agile guidance may address failure modes or adoption barriers in ways this comparison does not capture.

In practice, the framework offers a diagnostic sequence rather than a prescription. An organisation assessing its APM readiness can use Component 1 to identify which of the five rationale dimensions apply to its context and which governance gaps it actually faces. Component 2 helps assess whether the failure modes described in MT2.1 and MT2.2 are present and how acutely. Component 3 helps anticipate which of the three barrier categories will most constrain the implementation effort. Component 4 then identifies which governance mechanisms to prioritise and in what sequence, given those constraints. This use of the framework avoids two recurring implementation patterns that this review's findings surface across RQ1, RQ2 and RQ3: initiating governance design before the failure mode landscape is diagnosed (MT2.1, MT2.2; (Hoffmann et al., 2020; Stettina & Hörz, 2015)), and treating adoption barriers as implementation-phase details rather than structural preconditions for governance effectiveness (MT3.1–MT3.3); (Aghajani et al., 2023; Stettina & Hörz, 2015)).

The framework is explicitly tentative on causality. The MLR methodology is well suited to mapping the state of knowledge in a domain and identifying patterns across academic and practitioner literature. It is not designed to test hypotheses about causal relationships between governance designs and organisational outcomes. The framework describes what the evidence converges on as important, not what the evidence has demonstrated to produce better outcomes under controlled conditions. Empirical validation of the framework's components, particularly the governance architecture of Component 4 and the adoption dynamics of Component 3, is a productive direction for future research that Chapter 6 addresses.

The framework also carries contextual limits that responsible use requires acknowledging. The evidence base for Component 4 rests heavily on GL accounts from large-enterprise transformation programmes in technology-intensive industries, where Agile adoption was already well advanced and dedicated transformation resources were available. Organisations in different regulatory environments, at smaller scales, or in sectors where Agile adoption is at an earlier stage may find that the governance architecture mechanisms documented in MT4.1-MT4.6 require more substantial adaptation than direct transfer. The adoption barrier dynamics of Component 3 may also differ considerably between organisations with established Agile cultures and those approaching portfolio governance as part of a broader transformation effort. These differences are not defects in the framework's logic; they are the contextual parameters that empirical research needs to investigate. The framework's diagnostic-prescriptive structure is intended to remain useful across a range of contexts, but the specific

governance mechanisms it points toward are contextually sensitive in ways that the current evidence base does not fully resolve.

5.5 Implications for Research and Practice

This section sets out what the discussion in Sections 5.2 to 5.4 implies for researchers and practitioners. Section 6.5 turns these points into recommendations, and Section 6.7 sets out the research agenda in full.

5.5.1 Implications for Researchers

This review identifies several productive directions for future empirical research. The most pressing is the empirical validation of the governance mechanisms documented in MT4.1 and MT4.3. The convergence of independent practitioner sources on mechanisms such as portfolio Kanban, rolling-wave investment cycles, and OKR-based portfolio alignment provides confidence in their operational validity (Knaster & Leffingwell, 2020; *The Disciplined Agile® (DA™) Tool Kit*, n.d.), but this confidence rests on practitioner assertion rather than controlled empirical evidence. Longitudinal empirical designs that track governance design choices against organisational outcomes such as strategic alignment, delivery performance, and portfolio value realisation are needed to move the field from documented practice to tested knowledge. Section 6.7 develops this as a research direction.

The WL-GL divergence documented in MT1.2(Empirical Adaptive Governance) and MT4.1(Empirical Steering and Strategic Realignment) points to a significant methodological opportunity. The practitioner literature has documented adaptive governance mechanisms in operational detail that the academic literature has not yet theorised adequately. Research that takes practitioner accounts as its starting point rather than applying pre-existing theoretical frameworks to practitioner contexts has the potential to develop genuinely new theoretical contributions to portfolio governance knowledge. The MLR methodology itself demonstrates one approach to this and an embedded case study and action research designs offer others.

A further implication concerns the review design. In this study, including grey literature made some differences between the two streams visible, such as the higher number of GL extracts in MT4.1 (4.5:1) and the absence of GL extracts in MT1.5. A review limited to white literature would not have shown these differences. Future APM reviews may therefore benefit from including grey literature, because much of the documented

practice in this domain appears in practitioner sources. This is an observation about the method used and is not claimed as a contribution.

5.5.2 Implications for Practitioners

For practitioners designing or reforming portfolio governance systems, the conceptual framework's four components offer a diagnostic structure. Before addressing governance design, organisations should assess whether the failure modes described in Component 2 are present and identify which of the adoption barriers in Component 3 are most likely to constrain their implementation. This sequence matters because organisations that begin with governance design without having diagnosed the specific failure modes they are trying to address, and without having assessed the adoption barriers they will face, tend to produce governance models that are technically coherent but contextually inappropriate (Hoffmann et al., 2020).

The adoption paradox identified in Section 5.4 has a specific practical implication: because the conditions that make APM most necessary tend to be the conditions that make it hardest to adopt. The organisations facing the most urgent need for effective portfolio governance may simultaneously face the most intense political resistance to it. Managing this resistance appears to call for executive sponsorship with genuine authority and willingness to make the governance transformation a strategic priority, not merely an improvement initiative (Aghajani et al., 2023; Stettina & Hörz, 2015).

The governance architecture of Component 4 (**Figure 5-3**) implies a sequencing logic for APM implementation that the evidence base supports but does not make explicit. The Foundation Layer (MT4.2 Institutional Governance Architecture and PMO Design) may need to be in place before the Steering Layer (MT4.1 Empirical Steering and Strategic Realignment) can function effectively, because the evidence suggests that adaptive steering without organisational authority to act on steering decisions produces information without consequences. Similarly, the Visibility Layer (MT4.4 Portfolio Transparency and Financial Governance) may need to be operational before the Execution Layer (MT4.3 Decentralised Execution with Aligned Autonomy) can be trusted with genuine decision authority, because decentralisation without transparency may create conditions for local optimisation that undermine portfolio coherence. Practitioners who understand the architecture as a sequenced build rather than a simultaneous implementation are better positioned to manage the political and capability constraints that the adoption paradox creates. This involves establishing institutional mandate first, then building steering mechanisms, then extending decentralised autonomy as visibility improves. This progression is consistent with the staged adoption approach that the GL

evidence supports (Hoffmann et al., 2020; Knaster & Leffingwell, 2020; Stettina & Hörz, 2015).

The GL dominance in MT4.1 carries a practical implication that runs counter to the conventional assumption about the relationship between academic research and practitioner guidance. In this study, adaptive steering mechanisms are documented mainly in practitioner literature. Practitioners designing new governance systems may draw on that guidance without waiting for formal academic validation, while recognising that the governance principles in that guidance reflect large-enterprise implementation contexts and will require adaptation for organisations with different scales, regulatory environments, and transformation resources.

A practical question the framework cannot answer with the current evidence base is how organisations should know whether their governance architecture is working. The metrics available to assess APM effectiveness are largely borrowed from domains with different measurement logics. Financial governance metrics from traditional PMO practice measure budget conformance, not value delivery. Agile delivery metrics from team-level practice measure throughput and velocity, not strategic alignment.

What the RQ4 evidence implies is that effective APM governance needs a measurement layer positioned between these two levels that translates Agile delivery signals into strategic investment language without losing what makes each set of signals meaningful. Flow metrics, portfolio throughput, and investment-to-value ratios appear in GL sources as candidate instruments for this translation, but their validity as APM effectiveness measures has not been established empirically ((Knaster & Leffingwell, 2020; *The Disciplined Agile® (DATM) Tool Kit*, n.d.) . Practitioners designing governance systems should treat measurement design as a first-class governance concern rather than a reporting function, and should expect to iterate on it as the governance architecture matures.

5.6 Chapter Summary

Chapter 5 read the MLR findings through a problem-solution structure, from the strategic case for APM (RQ1) and the costs of its absence (RQ2) to the conditions that hinder adoption (RQ3) and the governance design principles the evidence supports (RQ4).

The central output is the conceptual framework in **Figure 5-3**. It brings the four RQ dimensions into one structure that can be used both diagnostically and prescriptively, and it does not replicate any prior model. Its design borrows from Zhao et al.'s (2024) composite synthesis approach and Antil's (2023) hierarchical level structure (Antil, 2023;

Zhao et al., 2024). Several established frameworks address parts of this problem: SAgile's Lean Portfolio Management (Knaster & Leffingwell, 2020), PMI's Disciplined Agile guidance (*The Disciplined Agile® (DA™) Tool Kit*, n.d.), Stettina and Hörz (2015), and Aghajani et al. (2023). None of them combine the diagnostic, barrier, and governance dimensions in a single structure. That integration is what **Figure 5-3** provides.

The evidence is thinner for MT4.5 (cross-level collaboration) and MT4.6 (interdependency governance), where the literature appears to lag practitioner experience. No longitudinal data tests whether the governance mechanisms recommended in GL sources produce the strategic outcomes they describe, and theory for adaptive portfolio governance is still developing relative to practice. Chapter 6 takes up these gaps.

Chapter 6 Conclusion

6.1 Introduction

This chapter brings together the principal findings, contributions and implications of the study. The Multivocal Literature Review (MLR) of academic (white) literature (WL) and grey literature (GL) produced a thematically synthesised body of evidence on the rationale for Agile Portfolio Management (APM) adoption, the consequences of its absence, the barriers to portfolio management transition, and the governance structures that enable effective APM at scale.

The argument throughout this thesis is that APM is not simply a methodological choice or operational preference. It is a governance capability that large-scale software development organisations may need to develop and sustain to maintain strategic alignment, manage portfolio complexity, and remain responsive to evolving business objectives.

Section 6.2 summarises the study, Section 6.3 the findings by research question, and Section 6.4 the contributions. Section 6.5 sets out recommendations for researchers and practitioners, Section 6.6 the limitations and threats to validity and Section 6.7 the directions for future research. Section 6.8 is a closing reflection.

6.2 Summary of the Study

The research aim that motivated this thesis was to produce an evidence-based account of APM governance through systematic synthesis of academic white literature and practitioner grey literature in large-scale software development organisations, specifically to address the gap between what academic literature theorises and what practitioners actually experience when implementing APM at scale. That aim was pursued through four research questions as below:

- RQ1: What is the need to adopt portfolio management in large-scale Agile software development?
 - RQ2: What are the challenges that large-scale organizations face in the absence of Agile Portfolio Management?
 - RQ3: What are the barriers that stop organizations from implementing PPM?
 - RQ4: What specific governance structures, roles, and decision-making processes within Agile Portfolio Management support continuous alignment with evolving business objectives?
-

The central research problem motivating this thesis is the persistent governance deficit in large-scale Agile software development organisations. As organisations scale Agile practices across multiple teams, programmes, and business units, the traditional project-centric governance models, designed for sequential plan-driven delivery, prove structurally inadequate (Stettina & Hörz, 2015). Portfolio-level decision-making, resource allocation, and strategic alignment break down under the demands of continuous delivery, rapid pivoting, and cross-team interdependencies. Despite the growth of scaled Agile frameworks such as the Scaled Agile Framework (SAFe) and Disciplined Agile (DA), there remains a gap in research-grounded, synthesised guidance on APM governance (Stettina & Hörz, 2015).

To address this gap, this thesis employed a Multivocal Literature Review (MLR) methodology (Garousi et al., 2019), integrating academic and practitioner knowledge. The MLR protocol combined PRISMA 2020 (Page et al., 2021) for white literature quality assessment with the AACODS checklist (Tyndall, 2008) for grey literature appraisal. This dual-pathway approach reflects a commitment to methodological rigour without excluding the practitioner-based knowledge that characterises APM development.

The review produced a final corpus of 41 sources (23 WL and 18 GL), from which 923 coded extracts were generated and synthesised through reflexive thematic analysis into 16 merged themes across the four research questions. The evidence pipeline is summarised in **Figure 6-1**.

Figure 6-1
MLR Evidence Pipeline Summary

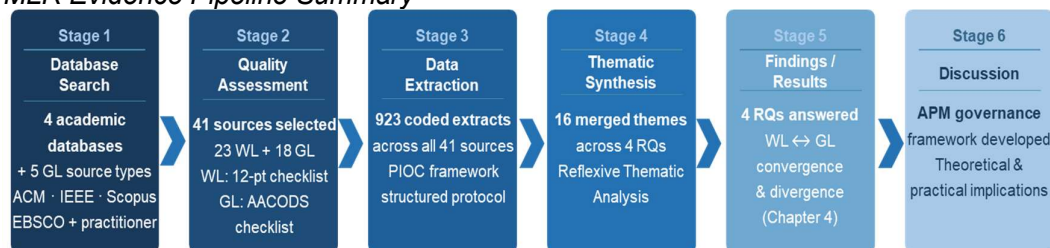


Figure 6-1 shows the six-stage evidence pipeline, from database search and grey literature identification through screening, quality assessment, data extraction and thematic synthesis to the findings and discussion chapters.

6.3 Summary of Key Findings by Research Question

The thematic synthesis produced findings for each research question, summarised below by merged theme.

RQ1: What is the need to adopt portfolio management in large-scale Agile software development?

The evidence for RQ1 (MT1.1–MT1.5) points to five dimensions of the rationale for APM adoption. MT1.1 (Portfolio Value Realisation Through Strategic Alignment), the largest RQ1 theme, indicates that APM provides mechanisms for aligning portfolio investment with organisational strategy on a continuing basis, in place of static annual planning. This is consistent with Hoffmann et al. (2020), who argue that portfolio alignment must be continuous rather than periodic. MT1.2 (Empirical Adaptive Governance) indicates that APM supports feedback-driven, iterative control of portfolio composition, in line with Stettina and Hörz (2015). MT1.3 (Flow Optimisation and Capacity Governance) concerns portfolio-level resource and capacity management, and MT1.4 (Collaborative and Behavioural Foundations of APM) indicates that adoption depends on collaborative conditions as well as structural change. MT1.5 (Formal Governance Infrastructure and PPM Architecture), the only theme drawn from white literature alone, covers the structural prerequisites for APM, including portfolio management office design and governance cadences. Taken together, these themes suggest that APM adoption may be driven by interlocking operational, competitive and cultural pressures.

RQ2: What are the challenges that large-scale organisations face in the absence of Agile Portfolio Management?

RQ2 surfaces two categories of challenge associated with APM absence (MT2.1 and MT2.2). MT2.1 (Strategic Drift and Value Leakage) captures the progressive misalignment between portfolio activity and strategic intent when portfolio-level governance is lacking. MT2.2 (Structural Fragmentation and Coordination Failure), the larger RQ2 theme, refers to siloed teams working without coordinated portfolio oversight, with duplicated effort and unmanaged dependencies. White and grey literature contribute at broadly comparable rates to both themes, although with different vocabularies. These findings give practitioners a diagnostic profile for assessing the consequences of APM absence in their own organisations.

RQ3: What are the barriers that stop organizations from implementing PPM?

The barriers to APM transition identified in RQ3 fall into three categories (MT3.1–MT3.3). MT3.1 (Socio-Political and Cultural Resistance), the largest RQ3 theme, encompasses senior leadership reluctance to relinquish centralised control, middle management concern about role displacement, and cultures that privilege predictability over adaptability. This is consistent with Stettina and Hörz (2015), who identify governance readiness and senior leadership commitment as conditions for large-scale Agile portfolio adoption. MT3.2 (Structural Complexity and Scalability Barriers) covers the

incompatibility of stage-gate approvals, annual budgeting cycles and hierarchical reporting with the iterative, decentralised demands of APM at scale. MT3.3 (Capability Deficits and Resource Constraints) covers the absence of portfolio management competencies, compounded by resource constraints that limit the building of new governance capability alongside existing delivery commitments. The GL:WL ratios differ across the three themes: MT3.1 draws mainly on grey literature (3.4), MT3.2 mainly on white literature (0.5), and MT3.3 most heavily on white literature (0.2), so each barrier draws its primary documentation from a different knowledge community.

RQ4: What specific governance structures, roles, and decision-making processes within Agile Portfolio Management support continuous alignment with evolving business objectives?

RQ4 findings identify six governance components associated with effective APM at scale. The grey literature contributes 62% of RQ4 extracts, the highest GL proportion of any research question, which may indicate that practitioners have documented governance mechanisms in more detail (Section 4.2). MT4.1 (Empirical Steering and Strategic Realignment), the largest RQ4 theme, covers portfolio cadences, visual management tools and iterative prioritisation, including portfolio Kanban, quarterly planning events and OKR-linked portfolio reviews. MT4.2 (Institutional Governance Architecture and PMO Design) concerns portfolio management offices, governance forums and decision rights that distribute governance authority across organisational layers. MT4.3 (Decentralised Execution with Aligned Autonomy) covers mechanisms that support team-level autonomy within strategic alignment, such as value stream definitions, portfolio epics and strategic themes. MT4.4 (Portfolio Transparency and Financial Governance) addresses investment horizon management, value-stream funding models and portfolio-level financial reporting; PMI (2023) and Scaled Agile (2023) provide guidance on integrating financial governance into Agile portfolio design. MT4.5 (Cross-Level Collaboration and Stakeholder Communication) covers communities of practice, governance forums and cross-functional coordination. MT4.6 (Complexity Navigation and Interdependency Governance), the smallest theme in the review, addresses dependency management across large-scale Agile portfolios, and its thin evidence base suggests a gap in both academic and practitioner literature. The correspondence between the RQ2 challenge categories and the RQ4 governance components underlies the diagnostic framework developed in Chapter 5.

6.4 Research Contributions

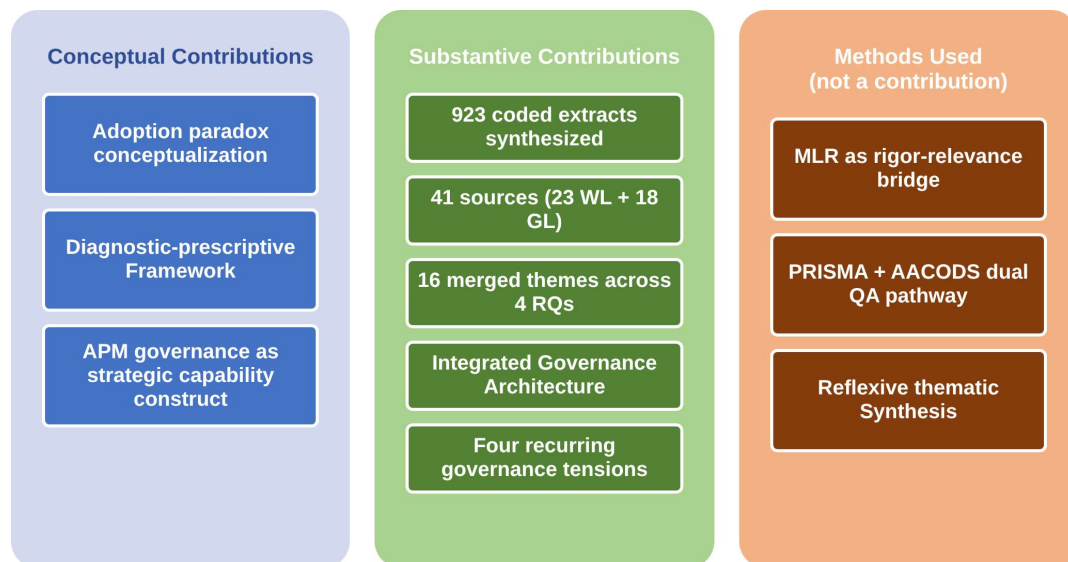
This thesis makes contributions in two of the three domains of the framework described by McGrath and Brinberg (1983), the Conceptual and Substantive domains. The

Methodological domain is used to report reflections on the methods and is not claimed as a contribution (McGrath & Brinberg, 1983).

Figure 6-2 provides a visual summary across conceptual, substantive, and methodological dimensions. The diagram presents the contributions of the thesis in the conceptual and substantive dimensions, using McGrath and Brinberg's (1983) framework. The conceptual dimension (left) captures the three conceptual contributions: the adoption paradox construct, the diagnostic-prescriptive framework for APM governance developed in Chapter 5 (**Figure 5-3**), and the framing of APM governance as a strategic capability construct.. The substantive dimension (centre) captures what the synthesis produced: 923 coded extracts drawn from 41 sources (23 WL + 18 GL), organised into 16 merged themes across four research questions, the Integrated Governance Architecture presented in Chapter 5 (**Figure 5-2**), and the four recurring tensions reported in Section 4.7. The methodological dimension (right) lists the methods used (the MLR, PRISMA 2020 and AACODS appraisal, and reflexive thematic analysis) and is shown as context, not as a contribution. The substantive synthesis makes possible the conceptual contributions.

The structure adapts McGrath and Brinberg's (1983) three-domain framework, in which research draws on conceptual ideas, methodological techniques, and substantive phenomena. Here the domains organise the theoretical ideas the thesis develops (Conceptual Domain), the knowledge it produces about APM governance (Substantive Domain), and the methods used, which are reported as reflections and not as a contribution (Methodological Domain). This structure separates what the thesis contributes from the methods used to produce it.

Figure 6-2
Principal Contributions of the Study



6.4.1 Conceptual Domain

The conceptual domain covers the theoretical constructs and frameworks that the thesis generates through its synthesis of white and grey literature. Three conceptual contributions emerge: the adoption paradox construct, the diagnostic-prescriptive framework arising from the RQ2-to-RQ4 challenge-solution correspondence, and the framing of APM governance as a strategic capability rather than a project delivery methodology.

The conceptual framework for APM governance developed in Chapter 5 (**Figure 5-3**) integrates the diagnostic and prescriptive dimensions of the study into a unified four-component structure, moving from the strategic rationale for APM through its failure modes and adoption barriers to the design principles of effective governance. This diagnostic-prescriptive structure is a synthesis of the findings of this review. Among the studies and frameworks discussed in this thesis, these dimensions are addressed individually. Stettina and Hörz (2015) examined portfolio governance practices in use, and Hoffmann et al. (2020) addressed strategic alignment mechanisms. The prescriptive frameworks such as SAFe (Knaster & Leffingwell, 2020) and PMI's portfolio standard (PMI, 2017) provide governance design guidance without addressing the diagnostic dimension, the strategic rationale for APM adoption or the structural failure modes that motivate governance reform. None of them integrates the strategic rationale, failure modes, adoption barriers, and governance design in a single diagnostic-prescriptive framework built from both academic and practitioner evidence (Hoffmann et al., 2020; Knaster & Leffingwell, 2020; Project Management Institute, 2017; Stettina & Hörz, 2015).

The most significant theoretical contribution within the conceptual domain is the conceptualisation and naming of the adoption paradox. Through systematic thematic synthesis, the MLR revealed a structural tension at the core of APM governance that the organisations most urgently in need of formalised portfolio governance are precisely those whose scale, complexity, and entrenched structures make adoption hardest. The paradox operates through two reinforcing mechanisms. First, large-scale complexity generates the strategic drift, value leakage, and structural fragmentation that APM is designed to address (MT2.1–MT2.2). Second, that same complexity produces the political resistance, structural incompatibility, and financial governance rigidity that together block APM adoption (MT3.1–MT3.3). This is not a problem that resolves itself over time. It intensifies as organisations scale. Naming this paradox and grounding it in the synthesis offers a construct that, within the literature reviewed here, has not been articulated for APM.

The adoption paradox has implications that reach beyond the APM domain. It contributes to the broader literature on governance transformation and organisational inertia by identifying how large organisations resist change that is simultaneously necessary and threatening to existing power structures (Hannan, 1984). Leadership alignment is widely recognised as a critical success factor in large-scale Agile transformation (Stettina & Hörz, 2015) and the adoption paradox provides a theoretical account of why that alignment is so difficult to secure at scale. These connections suggest the adoption paradox is not an isolated finding but a generative construct that can inform future research across governance, change management, and organisational theory.

The second major theoretical contribution is the diagnostic framework arising from the RQ2-to-RQ4 challenge-solution correspondence. The mapping between four categories of APM governance failure (RQ2) and four governance components enabling effective APM (RQ4) was surfaced through systematic thematic synthesis rather than prior theoretical design. This correspondence is a mid-range theoretical contribution as it offers an evidence-based account of how governance failures connect to governance solutions in a way that is specific enough to be actionable, yet general enough to apply across organisations of different sizes, sectors, and Agile maturity levels. For researchers, the framework offers a structured basis for investigating targeted APM governance interventions. For practitioners, it provides a sequencing logic for governance investment rooted in systematic synthesis rather than vendor-prescribed frameworks (Project Management Institute, 2017; Scaled Agile, Inc, 2023).

The third conceptual contribution is the reframing of APM governance as a strategic capability rather than a methodology selection. The evidence across 41 sources suggests that APM is an organisational capability and not a process overlay or a framework choice, one that may need to be built and sustained against structural and political resistance. This framing aligns APM governance research with the capability-building literature in strategic management and gives it a theoretical anchor that existing APM literature which tends toward prescriptive implementation guidance has not provided (Barney, 1991). Together, the adoption paradox, the diagnostic framework, and the strategic capability framing are this thesis's principal contributions to the emerging scholarly field of Agile portfolio governance. All three are grounded in systematic synthesis, theoretically situated, and practically applicable.

6.4.2 Methodological Domain: Reflections on the Methods

This domain reports reflections on the methods used. The study followed a documented MLR protocol in which white literature was appraised with PRISMA 2020 and grey literature with the AACODS checklist, and both streams were then synthesised together. These choices are described in Chapter 3 as methods and are not claimed as contributions.

The study shows that WL and GL are complementary, not competing, evidence streams in APM research. White literature sources (Hoffmann et al., 2020; Stettina & Hörz, 2015) provide theoretical grounding, empirical rigour, and critical distance from practitioner advocacy. Grey literature sources (Knaster & Leffingwell, 2020; Project management Institute, 2017; Scaled Agile, Inc, 2023) provide contemporaneity, practical detail, and access to implementation knowledge that academic publication timelines cannot capture. Neither stream alone would have surfaced the full range of evidence synthesised in this thesis.

The MLR also revealed insights that only become visible when the two evidence streams are analysed together. The financial governance gap which is the difference between grey and white literature in the number of extracts addressing financial governance barriers would be invisible in a WL-only review. The adoption paradox and the inverse relationship between governance complexity and adoption readiness required the triangulation of academic analysis with practitioner accounts of implementation failure to emerge as a coherent theoretical finding. These findings justify the choice of an MLR over a conventional systematic literature review (Garousi et al., 2019)

Reflexive thematic analysis (Braun & Clarke, 2019) was applied to heterogeneous secondary sources. This choice suited a domain such as APM, where the diversity of source types, audiences, and epistemological commitments makes conventional meta-analytic approaches unsuitable.

6.4.3 Substantive Domain

The substantive domain covers the empirical knowledge that this thesis generates about APM governance in large-scale software development organisations. Its primary contribution is a synthesis of academic and practitioner evidence on APM governance.

First, the thesis synthesises white and grey literature on APM governance in large-scale Agile software development. The data set of 41 sources, 923 coded extracts, and 16 merged themes covers both academic and practitioner perspectives. The thematic synthesis shows areas of convergence and divergence between the two streams that a review of either stream alone would not show. Table 2-1 compares this thesis with earlier reviews and models on scope, evidence and method.

Second, the thesis contributes the Integrated Governance Architecture (Chapter 5, **Figure 5-2**): a six-module layered governance structure derived from the RQ4 thematic synthesis. The architecture suggests that effective APM governance is not reducible to any single mechanism. Empirical steering (MT4.1) appears to depend on the institutional authority of a structured PMO (MT4.2); decentralised aligned autonomy (MT4.3) appears to depend on the visibility infrastructure provided by portfolio transparency and financial governance (MT4.4); collaboration routines (MT4.5) provide the relational medium through which the architecture maintains cross-organisational coherence; and interdependency management (MT4.6) prevents portfolio complexity from undermining strategic alignment. Existing APM governance literature addresses individual components of this architecture in isolation: Stettina and Hörz (2015) document portfolio practices in use empirically; Hoffmann et al. (2020) address strategic alignment mechanisms; and prescriptive frameworks such as SAFe (Knaster & Leffingwell, 2020) and PMI's portfolio standard (PMI, 2017) specify governance structures as implementation checklists. Based on literature that is in scope of this thesis, none of these prior contributions maps all six mechanisms as a formally integrated and interdependent architecture in which each layer depends on, and enables, the others.

Third, the cross-theme analysis identifies four recurring tensions in APM governance: centralisation and decentralisation, structure and adaptability, value and control, and speed and rigour (Section 4.7). The evidence suggests that these tensions are managed through governance design and not resolved by it (Section 5.3.8). They are an

interpretive reading of the coded extracts, and the poles of the third and fourth tensions were not coded as statements of the tension (Appendix K).

6.5 Recommendations

This section turns the implications in Section 5.5 into recommendations for researchers and for practitioners. The research agenda is set out in Section 6.7.

6.5.1 Recommendations for Researchers

The adoption paradox, the structural tension between governance complexity and adoption readiness, opens a substantial research programme for scholars working on technology adoption and governance transformation. Prior literature has documented adoption barriers and governance benefits separately (Hoffmann et al., 2020; Stettina & Hörz, 2015); no literature that was covered as the scope of this study has theorised the inverse relationship between the scale of governance need and adoption readiness as a coherent construct. Future researchers can use the adoption paradox as a sensitising concept for investigating why governance-intensive interventions fail in the organisations that most require them.

The diagnostic framework arising from the RQ2-to-RQ4 challenge-solution correspondence offers a structured basis for empirical testing. The four challenge-component mappings, governance dysfunction addressed by adaptive structures, structural fragmentation by role clarity, behavioural failures by alignment mechanisms, and strategic drift by governance culture, each constitute a testable proposition investigators can examine through case studies, survey instruments, or mixed-methods designs. The framework should be treated not as a confirmed model but as a theoretically grounded starting point for investigation across different organisational contexts and Agile maturity levels.

The financial governance gap identified through the WL+GL cross-stream comparison is a research gap that Section 6.7 develops. Grey literature most consistently identifies financial governance rigidity, specifically annual project-based budgeting, cost-centre funding models, and stage-gate financial controls, as a structural barrier to APM adoption (Knaster & Leffingwell, 2020; Project management Institute, 2017; Scaled Agile, Inc, 2023). Academic literature in the corpus addresses this barrier less often.

The thin evidence base in MT4.5 (Cross-Level Collaboration and Stakeholder Communication, n=15) and MT4.6 (Complexity Navigation and Interdependency Governance, n=5) identifies two domains where systematic empirical research is overdue. These are not peripheral concerns as the collaboration infrastructure is the

medium through which portfolio governance maintains cross-organisational coherence, and interdependency management at portfolio scale is one of the primary practical challenges that practitioners consistently identify as under-theorised. Dedicated empirical studies examining how effective portfolio-level communication architectures are structured and how interdependency governance operates at scale would address two of the most significant evidence gaps this review has identified. The MLR protocol developed for this thesis recommends a methodological template for future literature reviews in practitioner-led domains. The dual-pathway approach, combining PRISMA 2020 quality assessment for white literature with AACODS appraisal for grey literature within a single integrated protocol, is transferable to technology management, information systems, and software engineering topics where academic and practitioner knowledge co-evolve. The PIOC framework, quality assessment instruments, and reflexive thematic synthesis approach are available for adaptation in adjacent domains (Garousi et al., 2019; Kitchenham et al., 2009; Page et al., 2021; Tyndall, 2008).

6.5.2 Recommendations for Practitioners

The recommendations below draw on the thematic evidence synthesised by the MLR and are offered as suggestions to be tested in context, one for each stakeholder group.

- **Portfolio managers:** The challenge-profile diagnostic emerging from the RQ2-RQ4 correspondence provides portfolio managers with a structured tool for sequencing governance investments. Rather than attempting comprehensive governance transformation simultaneously, portfolio managers should use the diagnostic to identify their organisation's predominant challenge category and prioritise the corresponding governance component. Organisations experiencing primarily governance dysfunction (MT2.1) should focus first on establishing adaptive governance structures (MT4.1) such as portfolio Kanban, investment horizons, and regular portfolio reviews. Those experiencing structural fragmentation (MT2.2) should prioritise role clarity and decentralised accountability (MT4.2) before investing in alignment mechanisms.
 - **Executives and boards:** The evidence from MT1/4 (Collaborative and Behavioural Foundations of APM) and MT3.1 (Socio-Political and Cultural Resistance) suggests that cultural transformation may need to precede or accompany structural governance change. Boards and executive leadership teams that frame APM implementation as an IT or process improvement initiative are likely to fail, because the resistance they will encounter is fundamentally cultural and political not technical. The evidence suggests that APM calls for senior leadership to model visibly and consistently the behaviours that Agile
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governance demands: tolerance of uncertainty, willingness to end low-performing investments, and commitment to strategic transparency (Knaster & Leffingwell, 2020). The adoption paradox finding should be shared with boards as a risk management insight: large-scale organisations face the greatest governance challenge and may therefore need to make the most proactive governance investments.

- **Finance functions:** MT3.3 (Capability Deficits and Resource Constraints) identifies that insufficient portfolio management competencies compound structural barriers to adoption. Alongside this, MT4.4 (Portfolio Transparency and Financial Governance, n=40) establishes that value-stream funding and portfolio-level financial visibility are prerequisites for portfolio agility. Finance functions need to understand that annual, project-based cost-centre funding models are the most consistently cited structural barrier to APM adoption in the grey literature. Without the ability to redirect investment dynamically in response to portfolio performance signals, all other APM governance mechanisms are constrained. This thesis recommends that finance leadership engage directly with the APM governance design process, rather than being consulted as a compliance checkpoint. PMI (2017) and Scaled Agile (2023) both provide guidance on how financial governance can be integrated into Agile portfolio design (Project management Institute, 2017; Scaled Agile, Inc, 2023).
- **Agile coaches:** The adoption paradox has a direct implication for Agile coaches and transformation leads as the governance structures and cultural readiness may need to be developed in parallel and not sequentially. The common pattern in which structural governance change is implemented without sufficient cultural preparation predictably generates the resistance documented in MT3.1. Agile coaches should incorporate governance literacy into their coaching practice and helping teams understand why portfolio governance exists, how it enables rather than constrains team autonomy, and what their role is in sustaining portfolio visibility. The evidence from MT1.4 (Collaborative and Behavioural Foundations of APM) and MT4.1 (Empirical Steering and Strategic Realignment) suggests that governance culture is not a downstream benefit of structural change rather it is a precondition for structural change to succeed (Stettina & Hörz, 2015).

6.6 Limitations and Threats to Validity

The limitations of this study are presented as boundaries that define the scope and transferability of the findings, not as deficiencies that undermine their validity within that scope. Five principal limitations are identified.

First, publication bias in white literature sources represents an inherent limitation of any systematic review. Published academic studies on APM are more likely to report positive outcomes and successful implementations than failures, introducing a potential optimism bias into the theoretical evidence base. This limitation is partially mitigated by the inclusion of grey literature sources, though with an important qualification: grey literature carries its own advocacy risk, as practitioner publications may similarly over-represent successful implementations. The AACODS quality appraisal applied in this review explicitly assesses source authority, accuracy, and coverage, reducing reliance on promotional content. Within the quality-appraised grey literature corpus, implementation challenges, barriers, and partial failures are well-documented, and these sources produced the financial governance gap and adoption paradox findings that provide a counterweight to the positive orientation of the academic evidence base.

Second, the review was restricted to English-language sources. This restriction, while consistent with prevailing norms in systematic software engineering reviews (Kitchenham & Charters, 2007) means that relevant practitioner and academic contributions in languages other than English particularly from European and Asian APM practitioners are excluded. The generalisability of the findings to non-English-language organisational contexts should therefore be treated with appropriate caution.

Third, the review was restricted to the software and IT domain. APM as a governance practice is increasingly applied in sectors including healthcare, defence, financial services, and public administration. The extent to which the findings of this thesis transfer to non-software domains is not established by this review and represents a productive direction for future research.

Fourth, the scale criterion of several concurrent Agile teams and more than 250 employees (Section 1.6) could not be confirmed for every source. Conceptual papers and grey literature framework documents do not sample an organisation, and four white literature sources (EBSCO-RQ1-1, EBSCO-RQ1-12, IEEE-48 and Scopus-42) describe settings that may not meet it. These four supply 70 of the 923 coded extracts (7.6 per cent). No merged theme draws more than 19 per cent of its extracts from them (MT2.2, 16 of 85), and five themes (MT4.1, MT4.3, MT4.4, MT4.5 and MT4.6) draw none. The findings are therefore best read as applying to organisations that run several concurrent Agile teams. Their transfer to smaller organisations rests on the argument in Section 3.4.2 and not on direct evidence.

Fifth, all data extraction and thematic coding was conducted by a single researcher. The absence of independent inter-rater reliability assessment is a recognised limitation of

solo qualitative synthesis (Braun & Clarke, 2006). This limitation was mitigated through the use of a structured coding protocol, regular supervisor review of emerging themes, and documentation of coding decisions in the audit trail. Nevertheless, the coding and synthesis presented here represent one analytically situated interpretation of the evidence, and alternative thematic constructions remain possible. Three further limits apply. No reflexive memos were kept, so the tensions in Section 4.7 are reconstructed from the extracts. The section of origin of each extract was not recorded (Section 3.6). A record-level list of the 14 ACM records removed as conference proceedings was not kept (Section 3.4.4).

The limitations above are grouped here under the validity categories of Wohlin et al. (2024). The categories were written for experiments and case studies, so they are applied to this review by analogy.

Construct validity concerns whether the study's operational measures represent the concepts under study. The scale criterion could not be confirmed for every source (fourth limitation), and extract counts and GL:WL ratios are descriptive signals and not measures of evidential weight (Section 4.2).

Internal validity concerns causal relationships. The review does not test any. Statements about consequences, barriers and the links between themes report what the sources describe, and the four tensions and the adoption paradox are interpretations of the coded extracts (Section 4.7).

External validity concerns generalisation. The English-language restriction, the software and IT focus and publication bias limit the contexts to which the findings may apply (first to third limitations). Transfer rests on the breadth of the evidence base and not on statistical sampling (Section 3.7.4).

Conclusion validity, which (Wohlin et al., 2024) relate to reliability in qualitative work, concerns whether another researcher would reach the same conclusions from the same data. Single-researcher extraction and coding, the absence of reflexive memos and the missing list of removed ACM records weaken it (fifth limitation and the three further limits). The protocol, the audit trail and supervisory review reduce this threat but do not remove it.

6.7 Directions for Future Research

The findings of this thesis open four priority directions for future empirical and theoretical research on APM governance. These priorities are represented in the research priority

matrix in **Figure 6-3**, plotted according to their assessed practical impact and research feasibility.

The matrix is not intended as a definitive ranking but as a practical tool for researchers prioritising their contribution to the APM governance field.

Figure 6-3
Future Research Priority Matrix



- **Longitudinal APM governance sustainability studies:** The sustainability and long-term effectiveness of APM governance structures over time is a significant gap in the current literature. The MLR corpus is dominated by cross-sectional or implementation-focused studies. Longitudinal research designs tracking governance structures, team behaviours, and strategic outcomes over multi-year periods are needed to establish whether the adaptive structures identified in MT4.1 sustain their effectiveness as organisations grow, restructure, or undergo strategic change. Longitudinal studies would also allow investigation of governance regress and the conditions under which organisations that have achieved APM maturity revert to traditional portfolio governance.
- **Financial governance in APM:** The financial governance gap identified in this thesis is the difference between practitioner (GL) and academic (WL) sources in the number of extracts addressing financial barriers which points to a significant research opportunity. How do organisations redesign financial governance to support value-stream funding, rolling budget cycles, and portfolio-level investment transparency? What are the finance function competencies required for APM-compatible budgeting? These questions are addressed extensively in practitioner

frameworks (Knaster & Leffingwell, 2020; Project management Institute, 2017) but lack the empirical grounding that primary academic research could provide.

- **Sector-specific APM research:** The restriction of this review to software and IT organisations leaves open significant questions about APM governance in regulated industries, healthcare systems, government agencies, and other sectors where Agile adoption is accelerating but governance constraints differ substantially from commercial software environments (Project management Institute, 2017; Scaled Agile, Inc, 2023). Sector-specific APM research including comparative studies examining how governance mechanisms may need to be adapted for different regulatory and organisational contexts would substantially extend the practical utility of the APM governance knowledge base.
- **Role identity, power, and political dynamics in APM adoption:** The political and cultural resistance barrier identified in MT3.1 (n = 48, the largest RQ3 theme) warrants dedicated empirical investigation.. The mechanisms through which middle managers and senior leaders resist governance transformation, the role of identity threat (Ashforth & Mael, 1989) in sustaining resistance, and the political dynamics of portfolio prioritisation in large-scale Agile organisations are not adequately addressed in the current literature. Qualitative primary research including interviews, ethnographies, and case studies would provide the depth of understanding that literature review methodology cannot achieve.

6.8 Closing Reflection

This thesis began with an organisation that had a problem it could not see clearly. In 2017, a European financial services firm running 74 concurrent Agile development teams discovered that 61 per cent of its active projects had been designated highest priority by at least one senior stakeholder (Hoffmann et al., 2020). The organisation had technically mature teams. What it lacked was the portfolio-level governance capacity to ask a harder question: are all these teams collectively building what the organisation actually needs? That question and the systematic, evidence-grounded attempt to answer it is what this thesis has been about.

The synthesis produced here suggests that the problem facing that 2017 organisation is structural and widespread, not incidental. The adoption paradox construct names the dynamic precisely: the organisations most urgently in need of APM governance are the same organisations whose scale and entrenched structures make its adoption hardest. Recognising that paradox and offering a diagnostic framework for navigating it is among the most practically significant contributions this thesis makes.

The thesis takes academic rigour and practitioner experience equally seriously, and in doing so offers a foundation on which the next generation of empirical APM research can build. The financial governance gap, the longitudinal sustainability of APM governance structures, and the political dynamics of portfolio adoption are each substantive research problems that this thesis has surfaced and that now await dedicated empirical investigation.

Large-scale Agile organisations that invest in APM governance capability are not merely improving their project delivery. They are building the organisational infrastructure for sustainable strategic adaptation. Building agile portfolios at scale is difficult, contested, and consequential. It deserves serious scholarly attention, and this thesis has sought to provide it.

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Appendix A: MLR Protocol and Search Strategy

The finalised MLR protocol was reviewed and approved by supervisors (Assoc. Prof. Tony Clear and Dr. Ramesh Lal) prior to execution. The protocol file is: Portfolio Management in Large Scale Agile Software Development – MLR Protocol v05.docx.

Portfolio Management in Large Scale Agile Software Development

Multivocal Literature Review Protocol

Protocol Developed by: Sambreen Saleh

Supervisors: Tony Clear and Ramesh Lal

Year: 2025

Version: Final

1. Introduction

This protocol is the methodological plan for a proposed investigation into Agile Portfolio Management (APM) in large-scale organizations. It sets out the search strategy, selection criteria, and quality assessment process in enough detail that another researcher could follow the same steps and reach the same set of included studies (Batista et al., 2022). It also explains why White Literature (WL) and Grey Literature (GL) are searched and screened separately (Stettina & Hörz, 2015)

This study is focused on addressing the underlying need for PPM in large-scale Agile development and the specific governance mechanisms that enable organizations to maintain strategic alignment. The imperative to reconcile stability with adaptability drives the strategic necessity for Agile Portfolio Management (APM). APM serves as the adaptive response, integrating Lean principles and iterative practices into strategic governance to foster continuous strategic alignment and value delivery (Vario, 2022) We will also analyse the challenges that organizations face in the absence of Agile Portfolio Management in organizations. Traditional Project Portfolio Management (PPM), though conceptually designed for alignment, frequently devolves into systemic dysfunction, characterized by political fragility, cultural resistance, and endemic resource contention (the "Resource Paradox") (Vario, 2022). Understanding these aspects can help organizations better manage complexity, deliver sustained value, and remain responsive in an increasingly uncertain and dynamic market.

The Multivocal Literature Review (MLR) methodology outlined herein in this protocol is essential because empirical scholarly evaluation of APM mechanisms remains scarce, often lagging behind rapid industry practice (Aghajani et al., 2023; Vario, 2022). Consequently, this protocol formalizes the rigorous synthesis of both White Literature (academic rigor) and Grey Literature (practitioner relevance).

The criteria for identifying, screening, and appraising eligible materials are defined below so that the evidence base can support the study's empirical and theoretical contributions.

2. Background

To begin with, the concept of portfolio management has been thoroughly studied in various fields such as financial portfolio management, research and development, and new product development (Kumar R. 2008). The idea of portfolio management from the financial industry is introduced for two main reasons.

- To make informed and efficient investment decisions that result in delivering organizational benefits (H. Markowitz, 1952).
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- To optimize resource utilization to ensure that these benefits are delivered effectively and efficiently ((Dye & Pennypacker, 2000)).

However, McFarlan (1981) introduced the use of a Portfolio management approach to Software engineering, assuming that IT projects and programs, rather than assets or investments, are the components of the portfolio and that the collective management of these related or unrelated projects could optimize the organizational business outcome. Similar to financial portfolio management, the success of a single project doesn't guarantee the success of the entire portfolio (Sweetman, 2014).

Project Portfolio Management (PPM) is defined as the "collection of projects or programs and other work that is grouped to facilitate effective management of that work to meet strategic business needs." PPM provides a structured framework to identify, prioritize, authorize, and oversee projects in alignment with strategic goals while balancing risks and resource limitations (Project Management Institute, 2017). The primary goal of PPM is to ensure organizations invest in the right initiatives to maximize both short-term results and long-term strategic value (Dye & Pennypacker, 2000; Lock & Wagner, 2006).

The rise of Agile methodologies has transformed the way software development projects are delivered. Traditionally, Agile methods were intended for small, cross-functional project teams which are usually co-located; however, recently, Agile has been scaled across entire enterprises hence complex and large-scale projects have become a norm. Large-scale Agile development introduces new complexities that necessitate portfolio-level thinking to maintain alignment and coordination across teams, programs, and business units (Larman & Vodde, 2016; Knaster & Leffingwell, 2020). In Agile Portfolio Management (APM) responds to this challenge by incorporating iterative planning, flexible resource allocation, and value-based prioritization.

As the technology and organizations advance, the value of PPM becomes particularly apparent in complex environments where project interdependencies, resource contention, and dynamic market forces demand rigorous oversight and continuous coordination. According to Cooper (2011), PPM aims to achieve three primary goals that are value maximization, balanced portfolios with a mix of strategic and tactical projects, and strategic alignment along with consideration of non-financial factors. The research also indicates that high-performing organizations use PPM to guide decisions at the executive management level, ensuring strategic coherence and optimal resource allocation across organization (Killen, Hunt, & Kleinschmidt, 2008).

While Agile methods emphasize team autonomy and adaptability, organizations still need mechanisms to guide investment decisions, manage interdependencies, and evaluate performance across portfolios. APM introduces governance roles like Epic Owners, Portfolio Managers, and Lean Governance Boards to help balance agility with strategic oversight (Knaster & Leffingwell, 2020). These governance structures are designed to support decentralized decision-making while preserving alignment with broader business objectives.

The overarching aim of this research is to bridge the critical gap concerning the effectiveness of Agile Portfolio Management (APM) practices in Large-Scale Agile Software Development (LSASD) organizations.

Specifically, this study seeks to move beyond descriptive accounts of agile adoption by providing insights and recommendations for institutionalizing APM. The research endeavours to illuminate the specific governance structures and managerial processes required to reconcile the core tensions inherent in managing large portfolios: the simultaneous demands for strategic alignment, operational efficiency, and dynamic agility.

This research therefore addresses two gaps: the underlying need for PPM in large-scale Agile development, and the specific governance mechanisms that enable organizations to maintain strategic alignment. In order to fully capture the above two gaps, it is necessary to understand the challenges that organizations face in the absence of PPM.

The aim of this research is to create a foundation to bridge the gap between theory and practice by offering insights that help organizations enhance their Agile portfolio management strategies. By leveraging the dynamic capabilities concept along with PPM, companies can improve decision-making, streamline project coordination, and strengthen their ability to adapt to an increasingly complex software development environment.

3. Research Focus and Methodology

This study will adopt Multivocal literature review as unlike a traditional Systematic Literature Review (SLR), which focuses only on peer-reviewed academic sources, an MLR includes insights from both academic research (White Literature) and industry sources (Grey Literature), such as practitioner reports, blogs, and white papers (Dikert et al., 2016).

An MLR builds upon the traditional SLR by incorporating both White Literature (peer-reviewed research) and Grey Literature (practitioner reports, white papers, industry blogs, and other non-academic sources) (Garousi et al., 2019). This approach is particularly relevant for this study due to the following reasons:

- **Limited Academic Research:** While Project Portfolio Management (PPM) is a well-established discipline, the complexity of integrating its governance structures with the principles of Agile delivery makes Agile PPM poorly understood in academic research (Aghajani et al., 2023; Sweetman et al., 2014). Empirical investigation into the effectiveness and success of scaled Agile frameworks such as SAFe and LeSS at the portfolio level is still scarce (Aghajani et al., 2023). The majority of early investigations are often confined to limited single-case studies or descriptive experience reports, resulting in a lack of validated, generalizable findings (Stettina & Hörz, 2015). Hence, the MLR is necessary to assemble a comprehensive evidence base where formalized research remains insufficient.
- **Capturing Context-Driven and Evolving Practice:** APM is an emerging, practice-driven field where innovations often originate and evolve outside the conventional academic publishing cycle (Aghajani et al., 2023). The ability of organizations to adapt quickly is heavily shaped by real-world constraints and rapidly changing market demands (Vario, 2022). Including these perspectives ensure practical relevance and contextual relevance.
- **Practical Relevance:** Agile Portfolio Management is a real-world, practice-driven field. Practitioner documentation provides rich contextual details on enacted practices, roles, tools, and decision-making models (e.g., Lean budgeting, WSJF prioritization) that directly address the challenges observed in large-scale environments (Aghajani et al., 2023; Vario, 2022). The MLR ensures that the final synthesis captures this practical "actuality" of APM, which often clashes with the theoretical rigor found in traditional PPM models (Aghajani et al., 2023). Bridging the Rigor-Relevance Gap: By synthesizing findings across both literature streams, the MLR is a deliberate methodological choice to overcome the rigor-relevance gap often cited in strategic management literature (Batista et al., 2022), a claim also supported by (Aghajani et al., 2023).

4. Research Questions

The systematic guidance of strategic initiatives through Project Portfolio Management (PPM) is essential for maximizing business value and ensuring alignment with organizational strategy (Aghajani et al., 2023). However, the successful practices found

in Agile software development (ASD) at the team level, emphasizing iteration, customer collaboration, and responsiveness to change, are often constrained by the rigid, plan-driven processes of traditional PPM when scaled across large enterprises (Stettina & Hörz, 2015). Large-scale organizations struggle to achieve an IT PPM configuration that simultaneously meets the design goals of strategic alignment, operational efficiency, and dynamic agility (Hoffmann et al., 2020). Traditional PPM often fails due to structural rigidities, resource contention issues, and political barriers that block effective prioritization (Vario, 2022).

As mentioned above, there is a significant gap in the literature, as empirical evaluation of APM frameworks "in use" remains limited (Stettina & Hörz, 2015). While frameworks are proposed (e.g., SAFe, Lean Portfolio Management) (Martina Ononiwu et al., 2025), robust academic research lags behind practitioner experience (Aghajani et al., 2023). The Multivocal Literature Review (MLR) methodology is chosen to bridge this gap by synthesizing both academic rigor and practical relevance. With the above problems in mind, this research will aim to study and analyse the research questions below.

- **RQ1:** What is the need to adopt portfolio management in large-scale Agile software development?
- **RQ2:** What are the challenges that Organizations face in the absence of Portfolio Management?
- **RQ3:** What are the barriers that stop organizations from implementing PPM?
- **RQ4:** What specific governance structures, roles, and decision-making processes within Agile Portfolio Management support continuous alignment with evolving business objectives?

5. Search Strategy

This study employs a Multivocal Literature Review (MLR) methodology to ensure comprehensive knowledge synthesis, a strategy critically necessary due to the recognized rigor-relevance gap in APM research (Müller et al., 2025). Academic research often lacks extensive empirical evaluation of APM frameworks "in use" across multiple cases, while practitioner literature provides rich contextual data on enacted practices and challenges (Stettina & Hörz, 2015).

The MLR strategy aims to maximize comprehensive coverage of both the theoretical foundations (scholarly literature) and the current state of practice (grey literature) to achieve the research objective of developing empirically grounded governance recommendations that reconcile alignment, efficiency, and agility (Hoffmann et al., 2020).

5.1 Databases for Comprehensive Coverage

Choosing specific databases for White Literature (WL) and Grey Literature (GL) is a foundational step for this Multivocal Literature Review (MLR). Both streams are needed because of the "rigor-relevance gap": traditional scholarly databases provide theoretical depth, while practitioner repositories capture the "actuality" of Agile Portfolio Management (APM) in volatile, hyper-competitive environments (Batista et al., 2022; Stettina & Hörz, 2015)

5.1.1 White Literature Sources

A systematic, automated keyword search will be conducted across below well-established academic databases to establish the theoretical and empirical baseline for Agile Portfolio management, Large Scale Agile Software Development, and organizational agility. White Literature procurement relies on below databases for its extensive bibliometric coverage and rigorous indexing standards, which are essential for conducting a systematic PRISMA-compliant search that mitigates selection bias (Kitchenham & Charters, 2007). We have used the below academic databases to create a sound academic foundation.

- **ACM Digital Library:** This database was selected as it is critical for capturing core software engineering, Agile development, and technical governance literature.
 - **IEEE Xplore:** Essential for capturing core software, IT, Agile development, and technical governance literature.
 - **Scopus:** Essential for broad, interdisciplinary coverage across Business, Management, Engineering, and Computer Science journals, ensuring high-impact factors are included.
 - **EBSCO Host (Business Source Complete):** Necessary for covering literature on strategic management, organizational structure, Dynamic Capabilities theory, and portfolio control (RQ1, RQ3).
 - **Supplementary Search Technique (Snowballing):** To ensure no relevant studies are missed, backward and forward citation analysis (snowballing) will be applied to the reference lists of high-impact articles identified in the initial search and their subsequent citations as suggested by (Wohlin, 2014). This method will help identify additional academic publications that may not appear in initial database searches.
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5.1.2 Grey Literature Sources

Given the focus on APM practices, "enacted in practice." (Stettina & Hörz, 2015), the grey literature search will be structured to capture relevant industrial experience reports and normative frameworks. Since Agile Portfolio Management is heavily practiced and discussed in the Software industry, grey literature will be an essential component for capturing practitioners' perspectives and real-world applications (Garousi et al., 2019).

Targeted Sources and Repositories: The search will prioritize specific repositories known to publish formalized APM frameworks, best practices, and empirical insights from large-scale adoption:

- **Framework Documentation & Providers:** Direct searches will target the formal documentation and resources provided by developers of large-scale agile frameworks, which detail specific governance structures and roles necessary for enterprise agility:
 - **Scaled Agile Framework (SAFe):** Recognized as the most widely adopted scaling framework, SAFe provides extensive guidance on Portfolio Kanban, Lean Budgeting, and Agile Release Trains (ARTs), which are foundational to APM (*Scaling Agile*, n.d.; *The Ultimate Guide to Scaled Agile Frameworks*, n.d.)
 - **Large-Scale Scrum (LeSS), Scrum@Scale (SaS), Disciplined Agile (DA):** These frameworks offer alternative approaches to scaling agility at the portfolio level and contain critical practitioner insight into organizational structure and change management (*Comparison of Scaling Agile Frameworks: Which One Should You Choose?*, n.d.; *The Ultimate Guide to Scaled Agile Frameworks*, n.d.)
 - **Professional & Consulting Bodies:** Reports and white papers from major consulting firms (e.g., Deloitte, McKinsey) and professional organizations (**PMI**, **APM**) that provide critical analysis or case studies on APM adoption in large, complex organizations. Credible industry analysts and professional organizations often publish white papers, industry reports, and proprietary frameworks detailing the practice of APM:
 - **Project Management Institute (PMI):** PMI is recognized for championing PPM and developing standards; it provides reports and resources that
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address the challenges of integrating Agile into formal PPM structures.(Ajjan et al., 2013)

- **Major Consulting Firms:** Organizations like Deloitte and McKinsey publish analyses on the operational benefits of APM, hybrid approaches, and strategic transformation, which can provide empirical context for implementation outcomes.(Crew, 2025; Michael, n.d.)
- **Specialized Platforms:** Targeted searches of specialist platforms that focus on outcome-driven portfolio management and specific prioritization techniques (like Dragonboat, which discusses WSJF) will yield rich, practical implementation details.(Crew, 2025)
- **Industry-Specific Repositories:** Targeted searches of industry publications focused on high-turbulence sectors (e.g., FinTech, Over-The-Top (OTT) services) which provide examples of specialized solutions, particularly concerning technical interdependency and non-linear selection processes.
- **Videos and conference presentations** (e.g., Agile Alliance events, SAFe Summit, and YouTube channels of Agile experts).
- **Expert recommendation:** Recommendations from fellow researchers, practitioners and academic scholars.

To ensure credibility and quality, grey literature will be assessed using adapted versions of Garousi et al., 2019 credibility checklist, which includes factors such as author expertise, transparency, evidence, and relevance to the research questions.

5.2 Study Selection Criteria

To maintain the quality and focus of this study, both inclusion and exclusion criteria have been clearly defined. These criteria will guide the selection of relevant studies from academic and industry sources, ensuring that the review remains aligned with the research questions on Agile Portfolio Management in large-scale Agile software development.

5.2.1 Inclusion Criteria

This study will ensure that a focused and methodologically correct review is conducted; hence, the inclusion criteria are derived by using the PIOC (Population, Intervention, Outcome, Context) framework, which supports the selection of studies that are aligned with the core objectives of this research. The PIOC framework is a highly suitable methodological tool for structuring the complex exploratory and prescriptive inquiries that characterize research questions of this study. It ensures that the boundaries of this study are clearly defined, particularly given the inherent tensions between traditional Project

Portfolio Management (PPM) and Large-Scale Agile Software Development (LSASD) that this study is aiming to evaluate and analyse.

<ul style="list-style-type: none"> • PICOC Element 	<ul style="list-style-type: none"> • Applied Inclusion Criteria 	<ul style="list-style-type: none"> • Specific elements and Justification
<ul style="list-style-type: none"> • Population 	<ul style="list-style-type: none"> • Papers must focus on organizations or teams engaged in large-scale Agile software development. This includes enterprises with multiple Agile teams, scaled frameworks (e.g., SAFe, LeSS), or similar environments. 	<ul style="list-style-type: none"> • Organizations designated as large (typically exceeding 250 employees) (Stettina & Hörz, 2015) that utilize agile methods for managing multiple, complex, and highly interdependent software projects (Aghajani et al., 2023). These contexts are often characterized by inherent complexity, high levels of uncertainty, and volatile environments (Hoffmann et al., 2020). • GL Specifics: Includes practitioner reports from benchmark businesses (e.g., Spotify, Ericsson) and industry sectors like Fintech or Government (Olsen et al., 2025; Paasivaara et al., 2018)
<ul style="list-style-type: none"> • Intervention 	<ul style="list-style-type: none"> • The research must examine Agile Portfolio Management (APM) practices, roles, tools, or governance structures. This also includes the application of dynamic capabilities (e.g., sensing, seizing, reconfiguring) within the portfolio management process. 	<ul style="list-style-type: none"> • This focuses on the adoption and maturity of specific mechanisms designed to operationalize agility at the portfolio level (Müller et al., 2025). This includes frameworks (e.g., SAFe, Lean Portfolio Management, Kanban-based models), and key managerial practices such as dynamic prioritization (e.g., Weighted Shortest Job First, WSJF), participatory budgeting, and establishing continuous feedback loops (Martina Ononiwu et al., 2025)
<ul style="list-style-type: none"> • Outcome 	<ul style="list-style-type: none"> • The literature must report strategic alignment efforts, performance tracking, decision-making processes, 	<ul style="list-style-type: none"> • The achievement of the reconciled state, measured by the simultaneous realization of three design goals: Alignment with evolving business

	or value delivery outcomes (e.g., adaptability, responsiveness, or continuous alignment).	strategy/objectives, Efficiency (meeting quality, budget, and target dates), and Agility (responsiveness and dynamic adjustment to changing strategic trajectories). Success is also measured by improved decision-making, maximized resource usage, and overall portfolio health (Hoffmann et al., 2020).
• Context	• The study must be set in the context of real-world software development environments, particularly at scale. This includes enterprise Agile settings, public or private sector software organizations, or consultancies supporting such transformations.	• Factors external to the core APM practice that influence its outcome or adoption success. This includes organizational culture, management commitment, regulatory requirements, and the presence of technical interdependencies among projects (Aghajani et al., 2023).

Additionally, all included sources must meet the following general criteria:

- **Language:** Published in English.
- **Publication Type:**
 - White Literature: Peer-reviewed journal articles and conference proceedings from databases such as Scopus, IEEE Xplore, and ACM
 - Grey Literature: Must fall into 1st Tier (e.g., PMI white papers, SAF and scale agile whitepapers, government reports) or 2nd Tier (e.g., industry reports from McKinsey/Deloitte, curated practitioner videos/presentations)
- **Date Range:** Published between 2000 and 2025 to capture traditional and modern Agile practices. This range is selected to capture the evolution of agile from its manifesto origins to contemporary "Red Queen effect" dynamics in hyper-competitive markets.

- **Availability:** Full text must be accessible for thorough analysis. For Grey Literature, a structured stopping rule of the first 50 results per search string will be applied, subject to the observation of theoretical saturation.

5.2.2 Exclusion Criteria

A successful systematic literature review requires explicit and rigorously defined exclusion criteria to maintain focus and ensure the generalizability of findings within the scope established by the PIOC framework (Alves Teixeira & Drebes Pedron, 2023). The exclusion criteria below are formulated to screen out literature that does not directly address the institutional and governance challenges of Agile Portfolio Management (APM) within large, complex IT environments, thereby ensuring the research addresses the core inquiry regarding the reconciliation of alignment, efficiency, and agility (Hoffmann et al., 2020). To maintain study focus, WL and GL material will be excluded if they do not satisfy one or more components of the PIOC framework as applied to this research:

PIOC Element	Applied Exclusion Criteria	Specific Elements and Justification
Population	Researches that focus on non-software development contexts, non-Agile teams (e.g., Waterfall-only projects), or small-scale Agile teams without portfolio-level coordination will be excluded.	The study focuses on IT PPM, where the product (software/digital service) is inherently fluid and subject to continuous change requests, differing significantly from fixed-scope projects common in non-IT domains (Aghajani et al., 2023). As this research specifically investigates the scaling and governance complexity inherent to large organizations (defined as having >250 employees) (Stettina & Hörz, 2015). Exclusion of SME-focused studies ensures the findings address challenges arising from large organizational structure, bureaucracy, and hierarchy. GL Specifics: Includes practitioner reports from benchmark businesses (e.g., Spotify, Ericsson) and industry sectors like Fintech or Government (Stettina & Hörz, 2015).
Intervention	Studies that do not examine Portfolio Management or those that only discuss project-level or team-level practices without extending to portfolio governance, strategy alignment, or dynamic	The scope is governance at scale, i.e., Agile Portfolio management, not project-level mechanics. The research must address the structural changes necessary to support multiple agile teams (Aghajani et al., 2023). While optimization is relevant to PPM, this study focuses on the behavioral and political realities, such as power structures and opportunistic

	capability themes will be excluded.	stakeholder behaviors, which impede APM effectiveness (Hoffmann et al., 2020). GL Specifics: Excludes promotional materials, vendor white papers, or marketing brochures that lack objective empirical grounding or balanced presentation (Garousi et al., 2019; Vario, 2022)
Outcome	Studies that do not report outcomes related to strategic alignment, decision-making, governance roles, value delivery, or performance tracking will be excluded.	Success must be defined at the portfolio level (maximizing collective value, managing risk, alignment) rather than merely individual project metrics (on-time, on-budget completion of a single component (Olsen et al., 2025). GL Specifics: Excludes 3rd Tier GL (e.g., tweets, short LinkedIn posts, or brief news blurbs) that provides insufficient data granularity to reach theoretical saturation (Garousi et al., 2019)
Context	Literature published before 2000 or not published in English.	Imposing a temporal limit of 2000 forward ensures focus on the most contemporary discussions regarding large-scale APM adoption and reconciliation, as many seminal APM frameworks gained widespread adoption more recently. Non-English sources are typically excluded in systematic reviews to manage data processing feasibility (Alves Teixeira & Drebes Pedron, 2023) GL Specifics: Excludes sources where the producer's expertise or organizational affiliation cannot be verified (e.g., anonymous blogs), as these lack the outlet control necessary for doctoral-level evidence (Garousi et al., 2019)

Additional General Exclusion Criteria: Beyond the PIOC framework, the following operational boundaries are enforced to ensure auditability and focus:

- **Language:** Non-English studies will be excluded due to translation limitations.
- **Non-Substantive Formats:** Abstracts without full papers, editorials, promotional brochures, presentation slides, or non-research opinion pieces will be excluded.
- **Accessibility:** Studies with no full-text access available will be excluded.
- **Duplicate or Outdated Content:** Redundant publications or outdated reports that have since been replaced by more recent versions will be removed.
- **Sub-Tier Filtering:** Sources categorized as 3rd Tier Grey Literature (e.g., social media, emails, or personal opinion pieces without data) are excluded to minimize

subjective bias and ensure the synthesis remains high-fidelity (Garousi et al., 2019)

- **Duplicate Case Reports:** Where multiple GL sources (e.g., a blog post and a subsequent conference video) describe the same organizational transformation, only the most comprehensive version is retained (Garousi et al., 2019; Paasivaara et al., 2018)

This PIOC-driven exclusion logic complements the inclusion criteria, which strengthens the transparency, traceability, and replicability of the selection process for all GL and WL material.

The study selection criteria that will be followed in this study will ensure that the review remains focused and applicable to the real-world challenges of aligning organizational strategy in large-scale Agile software development using portfolio management.

5.3 Study Selection Process

In order to conduct a comprehensive and balanced review, this research aims to carry out the study selection process separately for White Literature (WL) and Grey Literature (GL). This distinction is necessary because each type of literature is accessed and evaluated differently, yet both are crucial to understanding the practical and academic perspectives of Agile Portfolio Management.

This research will follow the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) framework that will guide the study identification and screening process. Although PRISMA was originally designed for medical research, it has been widely adopted in software engineering and management literature reviews to ensure transparency and rigor.

5.3.1 Selection Process for White Literature (WL)

White Literature refers to formally published academic sources such as peer-reviewed journal articles and conference papers. The selection process for WL is systematic and follows established guidelines (Kitchenham & Charters, 2007):

- **Database Search:** Searches were conducted in respected academic databases, including:
 - ACM Digital Library
 - IEEE Xplore
 - Scopus
 - EBSCO
-

- **Use of Search Strings:** Tailored search strings were created based on the research questions using Boolean operators. These were applied across fields such as titles, abstracts, and keywords.
- **Title and Abstract Screening:** Each study was reviewed at the title and abstract level to determine relevance. Duplicates were removed during this phase.
- **Full-Text Review:** Selected studies underwent a thorough full-text review to ensure alignment with inclusion criteria and quality standards.
- **Snowballing:** To expand the pool of relevant studies, backward snowballing (checking references of selected articles) and forward snowballing (checking newer papers that cited the selected ones) were employed (Wohlin, 2014).

5.3.2 Selection Process for Grey Literature (GL)

Grey Literature encompasses non-peer-reviewed content like industry white papers, blogs, technical reports, conference presentations, and practitioner insights. Although less formal, this type of literature is essential in practice-oriented fields like Agile Portfolio Management. Its selection process requires a more flexible but rigorous approach (Garousi, Felderer, & Mäntylä, 2019):

- **Search Platforms:** Relevant GL will be gathered using search engines and specialized platforms such as:
 - Google (with domain-specific filters such as site: scaledagile.com, site: pmi.org)
 - LinkedIn, Medium, SlideShare, and YouTube (for webinars, practitioner talks)
 - Industry sources such as Gartner, Thoughtworks, and PMI White Papers
 - **Manual Screening:** Since GL lacks a consistent structure, each item was manually reviewed to assess its relevance to the research questions.
 - **Snowballing:** References within promising GL documents were explored to identify additional useful materials.
 - **Credibility and Relevance Check:** Documents were assessed based on author qualifications, organizational affiliation, and absence of promotional content. The goal was to include practical insights grounded in real-world experience.
 - **Full Review and Quality Evaluation:** Eligible GL items were reviewed in full and scored using a quality checklist adapted from Garousi et al. (2019), which was extended to include both white and grey literature. Each source was rated on clarity, relevance, traceability, and content depth.
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This two-track selection process ensures that the review captures both the theoretical underpinnings and the practical implementations of Agile Portfolio Management and dynamic capabilities, offering a holistic view of the subject matter.

5.3.3 Stopping Criteria for Grey Literature (GL) Search:

In order to have a more focused review, we have restricted the GL search to 50 records per predefined string and domain. The decision to constrain the Grey Literature (GL) screening to the initial 20 search results per predefined string is a methodologically grounded choice designed to balance the "rigor-relevance gap" while ensuring the operational auditability of this Multivocal Literature Review (MLR) (Garousi et al., 2019). In the context of Agile Portfolio Management (APM), where a single query may yield over a million results, a structured stopping rule is essential to prevent data fragmentation and maintain a transparent chain of evidence (Garousi et al., 2019)

The scholarly justification for this protocol boundary is supported by the following four methodological pillars:

1. **Algorithmic Relevance and Epistemic Authority:** We will utilize an "effort bounded" stopping rule, predicated on the efficacy of sophisticated relevance-ranking algorithms, such as Google's PageRank, which prioritize documents based on site credibility, user intent, and authority (Garousi et al., 2019; Langville & Meyer, n.d.). Methodological guidance for systematic reviews in software engineering and information technology suggests that the most influential practitioner-oriented insights such as those produced by recognized professional bodies like the Project Management Institute (PMI) or the Agile Alliance typically appear within these early search tiers (Garousi et al., 2019)
 2. **Heuristic Adaptation to Specificity:** While some seminal Multivocal Literature Reviews (MLRs) in software engineering have used a 50-hit limit, a 20-hit limit can be justified as an iterative adaptation when search strings are highly faceted (e.g., utilizing the PIOC framework)(Garousi et al., 2019). In cases where the subject is "complex" similar to this study and contextual information is vital, a narrower focus on the highest-quality practitioner evidence ensures the review bridges the "rigor-relevance gap" without being overwhelmed by the large volumes of low-quality data inherent in GL (Garousi et al., 2019)
 3. **Conceptual and Theoretical Saturation:** A primary goal of the synthesis phase is to reach "theoretical saturation," a point at which the inclusion of additional records or literature no longer yields novel thematic insights regarding APM need or governance routines (Garousi et al., 2019). Empirical observations in similar
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reviews indicate that the quality and novelty of evidence often decline precipitously beyond initial results, as lower-ranked pages frequently contain redundant content or non-vetted advertisements (Garousi et al., 2019). By limiting the hits to 20, we will be focusing on the most resonant evidence while avoiding the "noise" and data fragmentation that often occurs when investigating millions of hits (Garousi et al., 2019)

4. **Procedural Accountability and Replicability:** Formalizing a finite screening boundary is a critical requirement for generating a trustworthy and auditable methodology, as it minimizes selection bias and allows future researchers to replicate the search process precisely (Garousi et al., 2019). This approach facilitates a rigorous application of the PRISMA framework by providing a clear, documented accounting of all GL records identified, screened, and excluded, thereby ensuring the final synthesis is grounded in the most resonant evidence from the practitioner community (Garousi et al., 2019; Kitchenham & Charters, 2007)

The above suggest stopping rule will be applied *subject to the observation of saturation*. If the 20th record still provides novel conceptual themes, the protocol will be to allow for an incremental extension (e.g., in blocks of 10) to ensure high-fidelity findings (Garousi et al., 2019)

4.4 Search String

The formulation of search strings within this protocol is a rigorous, iterative process designed to establish heuristic validity and ensure the identified literature provides a direct evidence base for the research questions (Kitchenham & Charters, 2007). The justifications for the creation and refinement of these strings are founded upon the following methodological principles:

Search strings are not arbitrary but are linguistically mapped to the core components of the study's inquiry. This alignment ensures that the search syntax is capable of identifying primary studies that provide explicit evidence regarding Agile Portfolio Management (APM) (Kitchenham & Charters, 2007). By deriving terms directly from the RQs, the protocol ensures that the data extraction and synthesis phases are supported by relevant, high-fidelity findings (Kitchenham & Charters, 2007).

Each keyword search string below is designed to be combined to provide literature related to each research question.

RQ Focus	Keywords (Example)	Contextual Justification (Based on assumptions and experience)
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RQ1 (Need)	Rationale, Benefit, Value, Driver, Need, Necessity, Adoption	Links APM adoption to maximizing value to adapt to volatile environments.
RQ2 (Absence/Challenges)	Dysfunction, Inefficiency, Resource Conflict, Ad-hoc, Project Failure.	Focuses on systemic failures in IT PPM, including high project failure rates (a 60% failure rate for significant IT projects) and overloaded resources.
RQ3 (Barriers)	Barrier, Resistance, Culture, Internal Politics, Executive Intervention, Commitment.	Captures socio-political friction points that impede adoption, such as opportunistic stakeholder behavior and misalignment caused by power structures.
RQ4 (Governance/Solutions)	Governance, SAFe, Lean Portfolio Management, Alignment, Control.	Identifies prescriptive structures and frameworks used to manage complexity and reconcile APM goals.

5.3.4 WL Search String

Below is the final search strings based on the selection criteria mentioned above:

Database	RQ	Search String
Scopus	RQ1	(TITLE-ABS-KEY ("Portfolio Management" OR PPM OR "Agile Portfolio Management" OR APM OR "IT PPM") AND TITLE-ABS-KEY ("Agile" OR "Large Organization*" OR "Multi-project") AND TITLE-ABS-KEY (motivation OR Need OR Rational OR Necessity OR Driver OR Adoption OR Benefit OR Value) AND TITLE-ABS-KEY (Software OR "Information Technology")) AND (LIMIT-TO (DOCTYPE , "ar") OR LIMIT-TO (DOCTYPE , "cp"))
	RQ2	TITLE-ABS-KEY ("Portfolio Management" OR PPM OR "Agile Portfolio Management" OR APM OR "IT PPM") AND TITLE-ABS-KEY ("Agile" OR "Large Organization*" OR "Multi-project") AND TITLE-ABS-KEY (Challenge* OR Dysfunction* OR Absence OR Inefficiency OR "Resource Conflict*" OR "Systemic Failure") AND TITLE-ABS-KEY (Software OR "Information Technology")
	RQ3	TITLE-ABS-KEY ("Portfolio Management" OR PPM OR "Agile Portfolio Management" OR APM OR "IT PPM") AND TITLE-ABS-KEY ("Agile" OR "Large Organization*" OR "Multi-project") AND TITLE-ABS-KEY (Barrier* OR Resistance OR Impede* OR Implement* OR "Internal Politics" OR Culture OR Hierarchy OR Bureaucracy OR "Management Support" OR Commitment OR "Executive Intervention" OR Rigidity) AND TITLE-ABS-KEY (Software OR "Information Technology") AND (LIMIT-TO (DOCTYPE , "cr") OR LIMIT-TO (DOCTYPE , "cp") OR LIMIT-TO (DOCTYPE , "ar"))

	RQ4	(TITLE-ABS-KEY ("Portfolio Management" OR "Project Portfolio Management" OR PPM OR "Agile Portfolio Management" OR APM OR "IT PPM") AND TITLE-ABS-KEY ("Agile" OR "Large Organization") AND TITLE-ABS-KEY ("governance structure" OR "model" OR "decision making process" OR "roles" OR "strategic" OR "alignment" OR "organizational" OR "Framework" OR "objectives") AND TITLE-ABS-KEY (Software)) AND (LIMIT-TO (DOCTYPE , "cp") OR LIMIT-TO (DOCTYPE , "ar") OR LIMIT-TO (DOCTYPE , "cr"))
IEEE Xplore	RQ1	("All Metadata": "Portfolio Management" OR "All Metadata": "Project Portfolio Management" OR "All Metadata": "PPM" OR "All Metadata": "Agile Portfolio Management") AND ("All Metadata": Agile OR "All Metadata": "Large Organization") AND ("Full Text & Metadata": Motivation OR "Full Text & Metadata": Need OR "Full Text & Metadata": Rational OR "Full Text & Metadata": Necessity OR "Full Text & Metadata": Driver OR "Full Text & Metadata": Adoption OR "Full Text & Metadata": Benefit OR "Full Text & Metadata": Value) AND ("All Metadata": Software OR "All Metadata": "Information Technology")
	RQ2	((("All Metadata": "Portfolio Management" OR "All Metadata": "Project Portfolio Management" OR "All Metadata": PPM OR "All Metadata": "Agile Portfolio Management") AND ("All Metadata": "Agile" OR "All Metadata": "Large Organization*") AND ("Full Text & Metadata": "Challenge*" OR "Full Text & Metadata": "Dysfunction*" OR "Full Text & Metadata": "Absence" OR "Full Text & Metadata": "Inefficiency" OR "Full Text & Metadata": "Resource Conflict*" OR "Full Text & Metadata": "Systemic Failure") AND ("All Metadata": Software OR "All Metadata": "Information Technology"))
	RQ3	("All Metadata": "Portfolio Management" OR "All Metadata": "Project Portfolio Management" OR "All Metadata": PPM OR "All Metadata": "Agile Portfolio Management") AND ("All Metadata": Agile OR "All Metadata": "Large Organization*") AND ("Full Text & Metadata": Barrier* OR "Full Text & Metadata": Resistance OR "Full Text & Metadata": Impede* OR "Full Text & Metadata": Implement* OR "Full Text & Metadata": "Internal Politics" OR "Full Text & Metadata": Culture OR "Full Text & Metadata": Hierarchy OR "Full Text & Metadata": Bureaucracy OR "Full Text & Metadata": "Management Support" OR "Full Text & Metadata": Commitment OR "Full Text & Metadata": "Executive Intervention" OR "Full Text & Metadata": Rigidity) AND ("All Metadata": Software OR "All Metadata": "Information Technology")
	RQ4	((("All Metadata": "Portfolio Management" OR "All Metadata": "Project Portfolio Management" OR "All Metadata": PPM OR "All Metadata": "Agile Portfolio Management") AND ("All Metadata": Agile OR "All Metadata": "Large Organization") AND ("Full Text & Metadata": "Governance" OR "Full Text & Metadata": "decision

		making process" OR "Full Text & Metadata": "roles" OR "Full Text & Metadata": "Model" OR "Full Text & Metadata": "framework" OR "Full Text & Metadata": "Alignment" OR "Full Text & Metadata": "control") AND ("All Metadata": "Software" OR "All Metadata": "Information Technology"))
ACM Digital Library	RQ1	Abstract: ("Portfolio Management" OR "Project Portfolio Management" OR "PPM" OR "Agile Portfolio Management") AND AllField: (Agile OR "large organization*") AND AllField: (Motivation OR Need OR Rational OR Necessity OR Drive OR Adoption OR Benefit OR Value) [filter: E-Publication Date: 01/01/2000 TO 12/31/2026]
	RQ2	Abstract: ("Portfolio Management" OR "Project Portfolio Management" OR "PPM" OR "Agile Portfolio Management") AND AllField: (Agile OR "Large Organization*") AND AllField: (Challenge* OR absence OR inefficiency OR "resource conflict" OR "system failure" OR "project failure") [filter: E-Publication Date: 01/01/2000 TO 12/31/2026]
	RQ3	Abstract: ("Portfolio Management" OR "Project Portfolio Management" OR "PPM" OR "Agile Portfolio Management") AND AllField: (Agile OR "Large Organization*") AND AllField: (barrier* OR resistance OR implement OR "internal politics" OR culture OR hierarchy OR bureaucracy OR "management support" OR commitment OR "executive intervention" OR rigidity) [filter: E-Publication Date: 01/01/2000 TO 12/31/2026]
	RQ4	Abstract: ("Portfolio Management" OR "Project Portfolio Management" OR "PPM" OR "Agile Portfolio Management") AND AllField: (Agile OR "Large Organization*") AND AllField: ("governance structure" OR model OR "decision making process" OR roles OR strategic OR alignment OR organizational OR framework) [filter: E-Publication Date: 01/01/2000 TO 12/31/2026]
EBSCO	RQ1	("Portfolio Management" OR "Project Portfolio Management" OR "PPM" OR "Agile Portfolio Management") AND ("Agile" OR "Large Organization*") AND TX (motivation OR adoption OR need OR rational OR necessity OR benefit OR driver OR value) AND TX (software)
	RQ2	("Portfolio Management" OR "Project Portfolio Management" OR "PPM" OR "Agile Portfolio Management") AND ("Agile" OR "Large Organization*") AND TX (Challenge* OR Dysfunction* OR Absence OR Inefficiency OR "Resource Conflict*" OR "Systemic Failure*" OR "project failure*") AND TX (software)
	RQ3	((("Portfolio Management" OR "Project Portfolio Management" OR PPM OR "Agile Portfolio Management")) AND (("Agile" OR "Large Organization*")) AND TX ((Barrier* OR Resistance OR Impede* OR Implement* OR "Internal Politics" OR Culture OR Hierarchy OR Bureaucracy OR "Management Support" OR Commitment OR "Executive Intervention" OR Rigid*)) AND TX (Software)
	RQ4	((("Portfolio Management" OR "Project Portfolio Management" OR PPM OR "Agile Portfolio Management")) AND (Agile OR

"Large Organization*") AND TX ("governance structure" OR "model" OR "decision making process" OR "roles" OR "strategic" OR "alignment" OR "organizational" OR "Framework") AND TX (software)

5.3.5: GL Search Strings:

To address the above question, the GL search strings are:

RQ1: ("Agile Portfolio Management" OR "Project Portfolio Management" OR PPM OR APM) AND ("Large Organization" OR Agile) AND (motivation OR need OR rationale OR necessity OR driver OR adoption OR benefit OR value) AND (software OR "Information Technology")

RQ2: ("Agile Portfolio Management" OR "Project Portfolio Management" OR PPM OR APM) AND ("Large Organization" OR Agile) AND (challenge OR dysfunction OR absence OR inefficiency OR "resource conflict" OR "systemic failure") AND (software OR "Information Technology")

RQ3: ("Agile Portfolio Management" OR "Project Portfolio Management" OR PPM OR APM) AND ("Large Organization" OR Agile) AND (barrier OR resistance OR impediment OR "internal politics" OR culture OR hierarchy OR bureaucracy OR "management support" OR commitment OR "executive intervention" OR rigidity) AND (software OR "Information Technology")

RQ4: ("Agile Portfolio Management" OR "Project Portfolio Management" OR PPM OR APM) AND ("Large Organization" OR Agile) AND ("governance structure" OR model OR "decision making process" OR roles OR strategic OR alignment OR organizational OR framework) AND software

We have included domain filters to have advanced search based on selected domains as mentioned in search strategy.

- Site:pmi.org
- Site: scaledagileframework.com
- Site:atlassian.com
- Site:thoughtworks.com

5.4 Study Quality Assessment

To ensure the studies included in this review are trustworthy and relevant, we will apply a structured quality assessment process. This helps us identify reliable findings, minimize bias, and better understand how well each study answers our research questions. It's also a crucial step in separating high-quality evidence from weaker or less

transparent sources (Garousi et al., 2019; Kitchenham & Charters, 2007). During this research, we will assess both academic (white) and practitioner-based (grey) literature using a checklist inspired by the guidelines for Multivocal Literature Reviews (MLRs) developed by (Garousi et al., 2019). This checklist helps us evaluate not only how credible a source is but also how well the authors present their methods, back up their claims, and connect to our research focus.

The checklist covers six main areas:

1. How trustworthy the source is (e.g., is it peer-reviewed or from a reputable organization?)
2. Whether the study is methodologically sound
3. How transparent and unbiased the findings seem
4. Whether the content is clearly related to our research questions
5. The quality and depth of evidence presented
6. Whether the study contributes meaningfully to either research or practice

5.4.1 The Need for a Dual-Tiered Quality Assessment

Due to the nature of the study, which combines academic (WL) and practitioner resources (GL), a single unified scoring system is insufficient, as it risks excluding highly relevant practitioner sources that lack detailed methodology reporting (low academic rigor) but offer valuable empirical insights into complex real life phenomena (Hoffmann et al., 2020).

Therefore, the QA is separated into two distinct, yet complementary stages:

- **Quality Assessment of Scholarly Literature:** Focuses on methodological soundness and internal/external validity.
- **Critical Appraisal of Grey Literature:** Focuses on the utility, transparency, and contextual richness of reported findings relevant to APM governance

5.4.2 Quality Assessment of Scholarly Literature (Academic Sources)

Academic sources (e.g., peer-reviewed journals, rigorous conference proceedings) will be assessed using a tailored checklist focused on methodological standards adapted from established systematic review guidelines (Kitchenham & Charters, 2007)

Each question on the checklist will be answered with either “Yes” (scored as 1) or “No” (scored as 0), resulting in a maximum score of 12 points.

Study Quality Assessment Checklist

Category	Assessment Question	Response (Yes = 1 / No = 0)
Authority & Credibility	Is the source published in a peer-reviewed journal or by a credible organization?	
	Are the authors affiliated with recognized institutions or companies?	
Methodological Rigor	Does the study clearly describe its methodology or data collection process?	
	Are the results or arguments supported by evidence or reasoning?	
Objectivity & Transparency	Are potential biases, limitations, or conflicts of interest addressed?	
	Does the study distinguish between fact, opinion, and inference?	
Relevance to RQs	Does the content directly relate to at least one of the research questions (RQ1, RQ2, RQ3, or RQ4)?	
	Is Agile Portfolio Management discussed explicitly?	
Evidence Quality	Does the study present data, examples, or case details to support its claims?	
	Is the context (e.g., industry sector, team size, project scale) clearly described?	
Contribution to Field	Does the study theoretical insights relevant to Agile Portfolio Management?	
	Are the findings transferable to other large-scale Agile environments?	
Total Score		12

5.4.3 Quality assessment of Grey Literature (Practitioner Sources)

Grey literature (e.g., white papers, industry reports, specific frameworks like SAFe) is less likely to score highly on traditional methodological rigor, similar to academic resources, but is essential for capturing the contemporary “*practice in use*” (Stettina & Hörz, 2015) . To ensure the methodological integrity and epistemic authority of the practitioner-oriented evidence identified for this Multivocal Literature Review (MLR), the quality assessment criteria are refined using the AACODS (Authority, Accuracy, Coverage, Objectivity, Date, Significance) framework (Garousi et al., 2019). This structured approach is designed to bridge the “rigor-relevance gap” by applying a consistent, auditable lens to informal literature, ensuring it provides a direct evidence base for the updated Research Questions (RQ1–RQ4) (Ferreira & Nobre, 2022; Garousi et al., 2019)

Criterion Category	Definition	Assessment Question	Score
Authority (Source Credibility)	The evaluation focuses on the extent of expertise and the outlet control associated with the content produce (Garousi et al., 2019)	Is the source produced by a recognized professional body (e.g., PMI), a major framework developer (e.g., Scaled Agile Inc.), an established industry consultancy (McKinsey, Deloitte), or a verified practitioner expert with a principal-level designation in Large-Scale Agile	0-1
Accuracy (Transparency of Claims)	Accuracy is assessed based on the transparency of claims and the empirical grounding of the findings in the "actuality" of project-based management (Garousi et al., 2019; Stettina & Hörz, 2015)	Are the primary claims regarding the need, challenges, or governance of Portfolio Management supported by internal data, case examples, or expert reasoning, even if the underlying methodology is qualitative or exploratory	0-1
Coverage (Contextual and Stakeholder Granularity)	Coverage ensures the source provides the thematic depth required to address the complexity of large organizational settings (Garousi et al., 2019; Stettina & Hörz, 2015)	Question 1: Does the source provide context-rich detail addressing the strategic need [RQ1], the challenges of absent PM [RQ2], systemic implementation barriers [RQ3], or specific governance structures and decision processes (e.g., Lean budgeting, WSJF) [RQ4] Question 2: Is it clear whose "voice" is represented (e.g., senior leadership, PMO, or delivery teams), and is that perspective appropriate for the specific aspect of Portfolio Management being discussed	0-1
Objectivity (Bias Mitigation)	Objectivity filters the literature for vested interests and ensures a balanced presentation of the "lived experience" of practitioners (Garousi et al., 2019)	Does the source acknowledge the limitations, risks, or trade-offs (e.g., the "exploitation trap" or cultural resistance), or is it primarily a promotional artifact for a specific tool or vendor	0-1
Date (Temporal Relevance)	This criterion ensures the literature captures the dynamic evolution of agile practices in volatile digital environments (Garousi et al., 2019)	Is the source produced within the last ten years (2015–2025), and does it align with the modern concepts of Agile Portfolio Management.	0-1

Significance (Conceptual and Prescriptive Utility)	Significance measures the novelty and actionable value of the source's contribution to the thematic architecture of the review (Garousi et al., 2019)	Question 1: Does the source provide distinctive practical or conceptual insights that enrich the understanding of success factors or novel governance patterns in large-scale environments Question 2: Does the source offer concrete "guardrails," frameworks (e.g., SAFe LPM), or actionable patterns that can inform the analysis of governance structures and decision-making for RQ4	0-1
Maximum Score for Actuality			6

Below is the scoring guidelines used for assessment:

- **Authority**
 - 0 = Low/uncertain authority (anonymous/unclear expertise).
 - 1 = Adequate authority (recognised outlet, professional body, known expert, established consultancy).
- **Accuracy**
 - 0 = Claims not clearly supported by data/examples.
 - 1 = Claims supported by case examples, data, or explicit reasoning/references.
- **Coverage (vs your RQs)**
 - 0 = Only superficial or tangential mention of your RQs.
 - 1 = Directly addresses at least one of RQ1–RQ4 with usable detail.
- **Objectivity**
 - 0 = Strongly promotional/one-sided.
 - 1 = At least some balance (acknowledges constraints, context, or trade-offs).
- **Date**
 - 0 = Clearly outdated for current agile-at-scale practice.
 - 1 = Sufficiently recent/relevant to current APM practice.
- **Significance**
 - 0 = Little sign of influence/uptake.
 - 1 = Evident or plausible influence (cited, shared, or from central actors).

5.4.4 Scoring and Threshold Application

Overall Scoring: Each study can achieve a maximum score of 18 points (12 WL and 6 GL)

Threshold Strategy (MLR Approach):

- **Academic Literature (WL):** Sources achieving a minimum of 6 out of 12 points (50%) on the quality assessment are provisionally included. Sources that will be scoring below this threshold may be retained if they are frequently cited in high-quality sources or report seminal findings directly related to APM, but their methodological limitations will be discussed in the synthesis.
- **Grey Literature (GL):** Inclusion of these sources are dependent on achieving a minimum of 4 out of 6 points (66.7%) on the GL assessment. This approach prioritizes evidence of *relevance and contextual detail* over formal research process reporting, acknowledging that highly relevant findings from practitioners often lack the formal structure of academic reports (Dikert et al., 2016).

The properly categorized quality assessment ensures that the MLR maintains academic rigor while preventing the exclusion of essential, context-rich evidence concerning the complex, real-world deployment of portfolio management in large-scale agile environments.

5.4.5 Scoring and Reviewer Process

This study will follow below scoring process below to ensure quality papers are included in the research.

- All studies will be independently assessed by the primary researcher.
- Ambiguities or borderline cases will be discussed with the academic supervisor or a second reviewer to reach a consensus.
- Quality scores will be recorded in the data extraction spreadsheet to maintain transparency and auditability.

5.4.6 Filtering Criteria and sorting of papers of WL

The systematic filtering and sorting of the identified literature are paramount to maintaining the methodological rigor and transparency required for a high-fidelity Multivocal Literature Review (MLR) (Kitchenham & Charters, 2007). This process ensures that the synthesized findings are grounded in empirical evidence and theoretically aligned with the research inquiry concerning Agile Portfolio Management (APM) (Al Jabri et al., 2024; Vario, 2022). The following sections formalize the filtering and sorting criteria employed to establish a robust audit trail (Kitchenham & Charters, 2007)

5.4.6.1. Filtering Criteria for Selection

The initial screening phase utilizes binary filters to isolate the most pertinent scholarly contributions while ensuring data quality and relevance to the research questions (RQs) (Kitchenham & Charters, 2007)

- **Document Type:** This protocol restricts inclusion to peer-reviewed journal articles and conference papers to guarantee that the primary evidence has undergone a baseline of scholarly scrutiny (Batista et al., 2022; Kitchenham & Charters, 2007). While Grey Literature (GL) provides contextualized practitioner insights, the White Literature (WL) stream must be anchored in formalized research outputs to bridge the rigor-relevance gap effectively (Al Jabri et al., 2024; Batista et al., 2022).
- **PRISMA Suitability:** Informed by the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) framework, papers are evaluated for their empirical and conceptual congruence with the study's scope (Martina Ononiwu et al., 2025). A "Yes" designation indicates the WL meets quality and rigor expectations and contributes to the majority of the RQs, specifically addressing the "actuality" of project-based management and governance (Batista et al., 2022). On the other hand, papers classified as "No" are excluded with recorded justifications, such as being primarily technical or lacking context of Agile Portfolio Management (Batista et al., 2022; Martina Ononiwu et al., 2025).

5.4.6.2 Sorting Criteria and Suitability Ranking

Following the initial filtering, the remaining literature is categorized based on its potential to contribute actionable insights to the theoretical framework (Aghajani et al., 2023; Al Jabri et al., 2024)

Citation Count as a Proxy for Scholarly Impact: We will sort papers with citation count as count can serve as a bibliometric indicator of a paper's conceptual influence or "impact factor" within the domain of Agile Portfolio Management (APM) (Hadjinicolaou & Dumrak, 2017). By incorporating citation metrics, we objectively identify "foundational" works that have shaped the current understanding of APM

Suitability Tier: Each included WL source was assigned to one of three suitability tiers based on its PRISMA assessment outcome, quality score, and depth of RQ coverage:

- **High Suitability:** Papers classified as "High" are those that received a "Yes" in PRISMA screening, achieved a high quality score, and offer clear, comprehensive coverage of all four RQs (Aghajani et al., 2023)
-

- **Medium Suitability:** This rank is assigned to papers that meet the PRISMA inclusion criteria but provide more moderate or partial coverage of the RQs (Martina Ononiwu et al., 2025). These often have a narrower domain focus, such as specific industry-sector case studies (e.g., automotive or fintech), yet still offer valuable evidence for identifying Success Factors (SFs) or Success Criteria (SCs) in agile environments (Aghajani et al., 2023)
- **Low Suitability:** Sources designated as "Low" are excluded from the final synthesis due to insufficient coverage of portfolio-level governance or poor alignment with the research's strategic objectives (Al Jabri et al., 2024; Batista et al., 2022). This tiered sorting ensures that the final synthesis prioritizes the most influential and informative data, thereby maximizing the scholarly impact of the MLR (Kitchenham & Charters, 2007)

5.4.7 Purpose of Quality Assessment

The Quality Assessment step ensures that:

- Only methodologically sound academic studies and credible, practice-informed industry sources are included.
- The findings of the MLR are built upon high-quality, reliable evidence from both theory and practice.
- The review remains balanced between rigor and relevance—especially critical when synthesizing across academic and practitioner domains.

5.5 Data Extraction

After careful screening and selection of relevant literature, the primary aim of data extraction is to systematically isolate and record evidence related to the four foundational research inquiries. A rigorous, standardized data extraction instrument will be utilized and piloted beforehand to guarantee consistency across the dual streams of scholarly and grey literature (Olsen et al., 2025).

A standardized data extraction form will be developed and piloted on a few sample studies to refine the process. For each selected paper, key details will be recorded, including bibliographic information (such as authors, year, and publication source), research objectives, methodology, key findings, and how the study relates to Agile Portfolio Management, governance practices, and strategic alignment.

The extraction form serves as the primary instrument for mapping descriptive details and synthesizing analytic content, focusing on the following conceptual areas: To help organize this information, a data extraction template will be used based on the SLR guidelines of (Kitchenham & Charters, 2007). This template includes fields such as:

Data Category	Details to Capture for Extraction	Rational/Links to RQs
Bibliographic Info	Author(s), title, publication year, source type (journal, conference, report, etc.)	Essential for contextualizing findings and validating inclusion criteria related to population (P). MLR requires an explicit distinction between theoretical and practitioner sources(Aghajani et al., 2023)
Study Context and Design	Industry domain, organization type, team/project scale, geographic location. Empirical study (e.g., case study, survey), conceptual/theoretical, literature review	Determines the reliability and rigor of the source and its generalizability to large-scale organizations (Hoffmann et al., 2020)
Main Objectives	The study's purpose or problem that it attempts to address	Determine significance to the current study
Adoption Necessity (RQ1 Focus)	Explicit statements justifying the adoption of formalized Project Portfolio Management (PPM) or Agile Portfolio Management (APM). Evidence that PPM is a critical driver for achieving organizational objectives, strategic alignment, maximizing resource usage, and overall business value(Hadjinicolaou & Dumrak, 2017; Olsen et al., 2025)	Isolates the "why" or the strategic imperative for adopting a portfolio-level perspective in LSASD environments.
Absence & Dysfunction (RQ2 Focus)	Empirical reports or critical analyses detailing negative consequences in the absence of formalized PPM. Specifically, evidence of <i>ad hoc</i> decision-making leading to positive or negative outcomes, misalignment, resource conflicts/overload, and politically motivated project selections ("pet projects") (Aghajani et al., 2023)	Addresses the systemic failures and inefficiency that motivate change, essential for establishing the problem domain.

Implementation Barriers (RQ3 Focus)	Specific obstacles encountered during the transition to or institutionalization of APM. For example, resistance to change (cultural/organizational) (Hadjinicolaou & Dumrak, 2017), lack of sustained senior management commitment (Hadjinicolaou & Dumrak, 2017), rigidity of formal PPM structures (Aghajani et al., 2023).	Focuses on impediments and friction points, particularly where agile project practices clash with formal PPM governance requirements
Governance Structures & Practices (RQ4 Focus)	Prescriptive mechanisms and frameworks that support continuous alignment and agility	Captures the prescriptive solutions and effective practices for achieving the desired outcome of a reconciled APM configuration
Quality Score	As per the Study Quality Assessment checklist	This determines that the study is authentic and relevant to our study.

The data will be extracted manually and stored in a structured spreadsheet to facilitate thematic analysis and comparison across studies (Kitchenham & Charters, 2007). Additionally, Zotero will be used as the reference manager to organize sources, tag key themes, and maintain traceability of the extracted information.

The extracted data will not merely be summarized; rather, it will undergo a process of analytic code generation essential for Thematic analysis. For each source, the following interpretive steps will be recorded:

- **Verbatim Extraction:** The data extraction will capture direct quotes or specific empirical examples (e.g., "almost 50% of all active projects were highest priority" (Hoffmann et al., 2020) that illustrate the core concepts related to the four RQs.
- **Conflict Identification:** We will specifically note any contradictions or tensions reported between the academic expectations for APM (rigor) and the practical enactment of APM (flexibility/politics) (Hoffmann et al., 2020).
- **Initial Thematic Linkage:** The assignment of the initial RTA codes will be done, noting how the extracted evidence contributes to identifying *latent* themes (underlying beliefs, cultural shifts) versus *manifest* themes (formal procedures, metrics used) (Aghajani et al., 2023).
- **Metric Discrepancy:** We will document instances where traditional metrics (e.g., compliance to plan, milestone reports) are explicitly reported as being non-value-

adding, costly, or time-consuming when used with agile teams, contrasting these with successful, tailored agile delivery metrics (Aghajani et al., 2023).

This step is vital not only for synthesizing insights across a diverse body of literature but also for supporting transparency and replicability in the research process (Petticrew & Roberts, 2006; Garousi, Felderer, & Mäntylä, 2019). The extracted data will serve as the foundation for identifying patterns, drawing conclusions, and proposing future research directions.

5.6 Data Synthesis

After data extraction, the next crucial step in this research is data synthesis, where we will combine findings from a wide range of selected sources to answer the research questions in a meaningful and organized way. Data synthesis involves organizing and interpreting findings from the chosen primary studies to draw meaningful conclusions that address the research questions (Kitchenham & Charters, 2007). In this study, we will use Thematic Analysis (TA) as the main method for synthesizing qualitative data. TA is a popular technique in software research for identifying, analysing, and reporting patterns (themes) across a dataset, and it supports both qualitative and quantitative synthesis, such as finding common themes in the research areas and counting how often they occur (Braun & Clarke, 2006). Statistical research by Cruzes and Dybå (2011) found that nearly 70% of systematic literature reviews in the software technology world use TA as their primary synthesis method.

One of the advantages of using Thematic Analysis is its flexibility, as it can be applied either inductively (letting themes emerge from the data) or deductively (using pre-existing theories or frameworks), making it especially suitable for qualitative research. This makes it an ideal approach for our study, which explores emerging themes related to governance structures and strategic alignment in Agile Portfolio Management.

5.6.1 Why Thematic Synthesis?

We have decided to use the data synthesis method, as Thematic synthesis, as it combines conceptual and empirical findings, supports inductive exploration, and allows for the integration of different data themes. It enables comparison across various contexts, making it ideal for examining different implementations of APM in large-scale settings. This aligns with multivocal literature review guidelines, which stress including both academic and grey sources in applied research fields (Garousi et al., 2019).

While other synthesis methods like Grounded Theory (GT) are useful for building entirely new theories from data, TA, in contrast, is typically conducted after data collection and

is focused on summarizing and interpreting existing knowledge, which aligns with the goals of our literature-based study. Moreover, unlike GT, Thematic Analysis does not aim to develop an entirely new theory but to identify key themes based on existing literature and frameworks, hence making it a better methodological fit for this research. TA data synthesis approach is more suited to complex research concept, like Agile Portfolio Management (APM), where different organizations may implement portfolio management practices in unique ways. Since this research addresses organizational structures, governance, decision-making, and the application of dynamic capabilities, thematic synthesis offers both depth and flexibility in analysis.

Thematic synthesis is also well-suited for answering “how” and “why” questions, such as:

- **RQ1:** What is the need to adopt portfolio management in large-scale Agile software development?
- **RQ2:** What are the challenges that Organizations face in the absence of Portfolio Management?
- **RQ3:** What are the barriers that stop organizations from implementing PPM?
- **RQ4:** What specific governance structures, roles, and decision-making processes within Agile Portfolio Management support continuous alignment with evolving business objectives?

This aligns closely with the research goals, which focus on understanding nuanced processes rather than simply measuring outcomes.

5.6.2 Type of Thematic Analysis

For this study, we will be using Reflexive Thematic Analysis (TA) based on Braun and Clarke’s work (Braun, V., & Clarke, V., 2021). This method embraces the idea that qualitative research is interpretive and subjective, as this will allow us to actively make sense of the information from previous research rather than just following a strict codebook. This fits well with our approach since we’re exploring complex, ever-changing Agile environments and focusing on how organizations behave and make decisions. Reflexive TA is great for capturing the complexity of our topic because we can include our interpretation as a key part of the analysis. This is different from other forms of thematic analysis, like coding reliability TA, which tries to be more objective and emphasizes agreement between multiple coders. Given our goals, Reflexive TA feels like the best fit (Braun & Clarke, 2019; Terry, Hayfield, Clarke, & Braun, 2017).

5.7.3 Steps in the Thematic Synthesis Process

We will follow Braun and Clarke's (2006; 2021) phased framework:

- **Familiarization with the Data:** All extracted data from selected studies will be read and re-read to develop a deep understanding of the content. Early patterns and key ideas related to governance, alignment, and dynamic responsiveness in Agile environments will be noted.
- **Initial Coding (Open Coding):** Relevant data fragments (e.g., quotes, descriptions, models, findings) will be coded using open coding. Short phrases or keywords that capture the essence of each fragment will be assigned, such as "strategic alignment," "lean governance," or "cross-functional roles."
- **Developing Descriptive Themes:** Codes will be reviewed and grouped into broader descriptive themes. These may include "adaptive portfolio steering," "value stream coordination," or "strategic backlog prioritization."
- **Generating Analytical Themes:** Analytical themes will be created by interpreting the underlying meaning behind descriptive themes, addressing broader research implications, and theory-building opportunities.
- **Mapping Themes to Research Questions:** Themes will be explicitly aligned with the four research questions.
- **Synthesizing Across Literature Types:** Academic and grey literature will be compared to explore how scholarly perspectives align or contrast with industry practices. This multivocal perspective adds depth and real-world relevance to the findings.
- **Use of Visual Tools:** Concept maps, matrices, and summary tables will be used to visually represent how different themes interrelate and how they contribute to the overarching understanding of APM in large-scale settings.

6. Reporting the Review

The final stage involves the systematic synthesis and reporting of findings derived from both the White Literature (WL) and Grey Literature (GL) streams to answer the research questions.

7. Validation and Amendments

This draft of the review protocol will be submitted to MPhil supervisors, Dr. Ramesh Lal and Assoc. Prof. Tony Clear for their evaluation and feedback. In line with the SLR guidelines outlined by Kitchenham & Charters (2007), the protocol needs to be validated and approved to ensure that the following criteria are met:

- The search strings are directly derived from the research questions.
- The study selection criteria and processes for WL and GL are appropriate.
- The data extraction procedure is suitable for addressing the research questions.
- The data synthesis procedure is appropriate for answering the research questions.

Additionally, the foundational integrity of this research protocol will be secured through a Preliminary validation which is a miniaturized scoping exercise, often conceptualized as a "mini SLR" or pilot MLR which serves as a critical prerequisite to commencing the full Multivocal Literature Review (MLR) (Felizardo et al., 2017; Kitchenham & Charters, 2007). Systematic literature reviews (SLRs) and Multivocal Literature Review (MLR) traditionally begin with protocol preparation and a pilot test, sometimes called a "mini SLR," where researchers use a small sample of studies (e.g., from a single database) to pilot the protocol (Kitchenham & Charters, 2007). This preliminary validation will allow for adjustments to protocol items based on insights gained during the run, ensuring essential refinements before the full execution.

The primary purpose of this preliminary pilot study is to rigorously test the operational efficiency of the defined search strategies and the inherent clarity of the formal inclusion and exclusion criteria on a small, representative sample of the literature (Felizardo et al., 2017; Kitchenham & Charters, 2007). This process will enable the early detection and necessary refinement of any ambiguities, inconsistencies, or unpredicted search results, so the search and screening steps can be repeated consistently and the findings can be traced back to the studies that produced them (Kitchenham & Charters, 2007). This pilot stage tests the protocol on a small sample before it is used for the full MLR.

Based on results from "mini MLR", it is anticipated that some modifications may be needed when implementing the procedures in different contexts. Any necessary changes will be made to address potential shortcomings and enhance the protocol. All revisions will be documented, and the protocol will be updated accordingly

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9. References

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Appendix B: Database Search Strings (White Literature)

Table B1 presents the full Boolean search strings applied to each of the four White Literature databases by research question. A date filter of 01/01/2000 to 12/31/2026 was applied across all databases.

Table B1

Database Search Strings by Research Question

Database	RQ	Search String
Scopus	RQ1	(TITLE-ABS-KEY ("Portfolio Management" OR PPM OR "Agile Portfolio Management" OR APM OR "IT PPM") AND TITLE-ABS-KEY ("Agile" OR "Large Organization*" OR "Multi-project") AND TITLE-ABS-KEY (motivation OR Need OR Rational OR Necessity OR Driver OR Adoption OR Benefit OR Value) AND TITLE-ABS-KEY (Software OR "Information Technology")) AND (LIMIT-TO (DOCTYPE , "ar") OR LIMIT-TO (DOCTYPE , "cp"))
	RQ2	TITLE-ABS-KEY ("Portfolio Management" OR PPM OR "Agile Portfolio Management" OR APM OR "IT PPM") AND TITLE-ABS-KEY ("Agile" OR "Large Organization*" OR "Multi-project") AND TITLE-ABS-KEY (Challenge* OR Dysfunction* OR Absence OR Inefficiency OR "Resource Conflict*" OR "Systemic Failure") AND TITLE-ABS-KEY (Software OR "Information Technology")
	RQ3	TITLE-ABS-KEY ("Portfolio Management" OR PPM OR "Agile Portfolio Management" OR APM OR "IT PPM") AND TITLE-ABS-KEY ("Agile" OR "Large Organization*" OR "Multi-project") AND TITLE-ABS-KEY (Barrier* OR Resistance OR Impede* OR Implement* OR "Internal Politics" OR Culture OR Hierarchy OR Bureaucracy OR "Management Support" OR Commitment OR "Executive Intervention" OR Rigidity) AND TITLE-ABS-KEY (Software OR "Information Technology") AND (LIMIT-TO (DOCTYPE , "cr") OR LIMIT-TO (DOCTYPE , "cp") OR LIMIT-TO (DOCTYPE , "ar"))
	RQ4	(TITLE-ABS-KEY ("Portfolio Management" OR "Project Portfolio Management" OR PPM OR "Agile Portfolio Management" OR APM OR "IT PPM") AND TITLE-ABS-KEY ("Agile" OR "Large Organization") AND TITLE-

		ABS-KEY ("governance structure" OR "model" OR "decision making process" OR "roles" OR "strategic" OR "alignment" OR "organizational" OR "Framework" OR "objectives") AND TITLE-ABS-KEY (Software)) AND (LIMIT-TO (DOCTYPE , "cp") OR LIMIT-TO (DOCTYPE , "ar") OR LIMIT-TO (DOCTYPE , "cr"))
IEEE Xplore	RQ1	("All Metadata": "Portfolio Management" OR "All Metadata": "Project Portfolio Management" OR "All Metadata": "PPM" OR "All Metadata": "Agile Portfolio Management") AND ("All Metadata": "Agile" OR "All Metadata": "Large Organization") AND ("Full Text & Metadata": "Motivation" OR "Full Text & Metadata": "Need" OR "Full Text & Metadata": "Rational" OR "Full Text & Metadata": "Necessity" OR "Full Text & Metadata": "Driver" OR "Full Text & Metadata": "Adoption" OR "Full Text & Metadata": "Benefit" OR "Full Text & Metadata": "Value") AND ("All Metadata": "Software" OR "All Metadata": "Information Technology")
	RQ2	((("All Metadata": "Portfolio Management" OR "All Metadata": "Project Portfolio Management" OR "All Metadata": "PPM" OR "All Metadata": "Agile Portfolio Management") AND ("All Metadata": "Agile" OR "All Metadata": "Large Organization*)) AND ("Full Text & Metadata": "Challenge*" OR "Full Text & Metadata": "Dysfunction*" OR "Full Text & Metadata": "Absence" OR "Full Text & Metadata": "Inefficiency" OR "Full Text & Metadata": "Resource Conflict*" OR "Full Text & Metadata": "Systemic Failure") AND ("All Metadata": "Software" OR "All Metadata": "Information Technology"))
	RQ3	("All Metadata": "Portfolio Management" OR "All Metadata": "Project Portfolio Management" OR "All Metadata": "PPM" OR "All Metadata": "Agile Portfolio Management") AND ("All Metadata": "Agile" OR "All Metadata": "Large Organization*)) AND ("Full Text & Metadata": "Barrier*" OR "Full Text & Metadata": "Resistance" OR "Full Text & Metadata": "Impede*" OR "Full Text & Metadata": "Implement*" OR "Full Text & Metadata": "Internal Politics" OR "Full Text & Metadata": "Culture" OR "Full Text & Metadata": "Hierarchy" OR "Full Text & Metadata": "Bureaucracy" OR "Full Text & Metadata": "Management Support" OR "Full Text & Metadata": "Commitment" OR "Full Text & Metadata": "Executive Intervention" OR "Full Text & Metadata": "Rigidity") AND ("All Metadata": "Software" OR "All Metadata": "Information Technology")
	RQ4	((("All Metadata": "Portfolio Management" OR "All Metadata": "Project Portfolio Management" OR "All Metadata": "PPM" OR "All Metadata": "Agile Portfolio Management") AND ("All Metadata": "Agile" OR "All Metadata": "Large Organization") AND ("Full Text & Metadata": "Governance" OR "Full Text & Metadata": "decision making process" OR "Full Text & Metadata": "roles" OR "Full Text & Metadata": "Model" OR "Full Text & Metadata": "framework" OR "Full Text & Metadata": "Alignment" OR "Full Text & Metadata": "control") AND ("All Metadata": "Software" OR "All Metadata": "Information Technology"))

ACM Digital Library	RQ1	Abstract:("Portfolio Management" OR "Project Portfolio Management" OR "PPM" OR "Agile Portfolio Management") AND AllField:(Agile OR "large organization*") AND AllField:(Motivation OR Need OR Rational OR Necessity OR Drive OR Adoption OR Benefit OR Value) [filter: E-Publication Date: 01/01/2000 TO 12/31/2026]
	RQ2	Abstract:("Portfolio Management" OR "Project Portfolio Management" OR "PPM" OR "Agile Portfolio Management") AND AllField:(Agile OR "Large Organization*") AND AllField:(Challenge* OR absence OR inefficiency OR "resource conflict" OR "system failure" OR "project failure") [filter: E-Publication Date: 01/01/2000 TO 12/31/2026]
	RQ3	Abstract:("Portfolio Management" OR "Project Portfolio Management" OR "PPM" OR "Agile Portfolio Management") AND AllField:(Agile OR "Large Organization*") AND AllField:(barrier* OR resistance OR implement OR "internal politics" OR culture OR hierarchy OR bureaucracy OR "management support" OR commitment OR "executive intervention" OR rigidity) [filter: E-Publication Date: 01/01/2000 TO 12/31/2026]
	RQ4	Abstract:("Portfolio Management" OR "Project Portfolio Management" OR "PPM" OR "Agile Portfolio Management") AND AllField:(Agile OR "Large Organization*") AND AllField:("governance structure" OR model OR "decision making process" OR roles OR strategic OR alignment OR organizational OR framework) [filter: E-Publication Date: 01/01/2000 TO 12/31/2026]
EBSCO	RQ1	("Portfolio Management" OR "Project Portfolio Management" OR "PPM" OR "Agile Portfolio Management") AND ("Agile" OR "Large Organization*") AND TX (motivation OR adoption OR need OR rational OR necessity OR benefit OR driver OR value) AND TX (software)
	RQ2	("Portfolio Management" OR "Project Portfolio Management" OR "PPM" OR "Agile Portfolio Management") AND ("Agile" OR "Large Organization*") AND TX (Challenge* OR Dysfunction* OR Absence OR Inefficiency OR "Resource Conflict*" OR "Systemic Failure*" OR "project failure*") AND TX (software)
	RQ3	((("Portfolio Management" OR "Project Portfolio Management" OR PPM OR "Agile Portfolio Management")) AND (("Agile" OR "Large Organization*")) AND TX ((Barrier* OR Resistance OR Impede* OR Implement* OR "Internal Politics" OR Culture OR Hierarchy OR Bureaucracy OR "Management Support" OR Commitment OR "Executive Intervention" OR Rigid*)) AND TX (Software))
	RQ4	((("Portfolio Management" OR "Project Portfolio Management" OR PPM OR "Agile Portfolio Management")) AND (Agile OR "Large Organization*") AND TX ("governance structure" OR "model" OR "decision making process" OR "roles" OR "strategic" OR "alignment" OR "organizational" OR "Framework") AND TX (software))

Appendix C: Study Selection Criteria (PIOC Framework)

Study selection criteria were structured using the PIOC framework (Population, Intervention, Outcome, Context), adapted from the PICOC framework (Kitchenham & Charters, 2007). The Comparison dimension was excluded as the research does not compare portfolio management approaches. Tables B1 and B2 present the full inclusion and exclusion criteria applied uniformly across both White and Grey Literature streams.

C1: PIOC Based Inclusion Criteria

PIOC Element	Applied Inclusion Criteria	Specific elements and Justification
Population	Papers must focus on organizations or teams engaged in large-scale Agile software development. This includes enterprises with multiple Agile teams, scaled frameworks (e.g., SAFe, LeSS), or similar environments.	Organizations designated as large (typically exceeding 250 employees) (Stettina & Hörz, 2015) that utilize agile methods for managing multiple, complex, and highly interdependent software projects (Aghajani et al., 2023). These contexts are often characterized by inherent complexity, high levels of uncertainty, and volatile environments (Hoffmann et al., 2020). GL Specifics: Includes practitioner reports from benchmark businesses (e.g., Spotify, Ericsson) and industry sectors like Fintech or Government (Olsen et al., 2025; Paasivaara et al., 2018)
Intervention	The research must examine Agile Portfolio Management (APM) practices, roles, tools, or governance structures.	This focuses on the adoption and maturity of specific mechanisms designed to operationalize agility at the portfolio level (Müller et al., 2025). This includes frameworks (e.g., SAFe, Lean Portfolio Management, Kanban-based models), and key managerial practices such as dynamic prioritization (e.g., Weighted Shortest Job First, WSJF), participatory budgeting, and establishing continuous feedback loops (Martina Ononiwu et al., 2025)
Outcome	The literature must report strategic alignment efforts, performance tracking, decision-making processes, or value delivery outcomes such as adaptability, responsiveness, or continuous alignment. The three main outcome dimensions namely	The achievement of the reconciled state, measured by the simultaneous realization of three design goals: Alignment with evolving business strategy/objectives, Efficiency (meeting quality, budget, and target dates), and Agility (responsiveness and dynamic adjustment to changing strategic trajectories). Success is also

	<p>alignment, efficiency, and agility — were not predetermined. They emerged from an initial scoping review of abstracts conducted during the pilot study (Section 3.2), in which these three constructs recurred consistently across APM governance sources. Hoffmann et al. (2020) provide the most explicit articulation of the pattern: their revelatory case study at a European financial institution identifies the simultaneous pursuit of alignment, efficiency, and agility as the defining challenge of IT portfolio management. The same triad is evident in Aghajani et al., 2023 and Stettina & Hörz, 2015. The outcome criteria in this study are therefore derived from what the literature reports, not imposed on it in advance</p>	<p>measured by improved decision-making, maximized resource usage, and overall portfolio health(Hoffmann et al., 2020).</p>
Context	<p>The study must be set in the context of real-world software development environments, particularly at scale. This includes enterprise Agile settings, public or private sector software organizations, or consultancies supporting such transformations.</p>	<p>Factors external to the core APM practice that influence its outcome or adoption success. This includes organizational culture, management commitment, regulatory requirements, and the presence of technical interdependencies among projects (Aghajani et al., 2023).</p>

C2: PIOC-Based Exclusion Criteria

PIOC Element	Applied Exclusion Criteria	Specific Elements and Justification
Population	<p>Research studies that focus on non-software development contexts, non-Agile teams (e.g., Waterfall-only projects), or small-scale Agile teams without portfolio-level coordination will be excluded.</p>	<p>The study focuses on IT PPM, where the product (software/digital service) is inherently fluid and subject to continuous change requests, differing significantly from fixed-scope projects common in non-IT domains(Aghajani et al., 2023). As this research specifically investigates the scaling and governance complexity inherent to large organizations (defined as having >250 employees) (Stettina & Hörz, 2015). Exclusion of SME-</p>

		<p>focused studies ensures the findings address challenges arising from large organizational structure, bureaucracy, and hierarchy. GL Specifics: Excludes practitioner reports from micro-startups or single-team case studies that do not face the systemic complexity of enterprise scaling (Stettina & Hörz, 2015)</p>
Intervention	<p>Studies that do not examine Portfolio Management or those that only discuss project-level or team-level practices without extending to portfolio governance, will be excluded.</p>	<p>The scope is governance at scale, i.e., Agile Portfolio management, not project-level mechanics. The research must address the structural changes necessary to support multiple agile teams (Aghajani et al., 2023). While optimization is relevant to PPM, this study focuses on the behavioral and political realities, such as power structures and opportunistic stakeholder behaviors, which impede APM effectiveness (Hoffmann et al., 2020). GL Specifics: Excludes promotional materials, vendor white papers, or marketing brochures that lack objective empirical grounding or balanced presentation (Garousi et al., 2019; Vario, 2022)</p>
Outcome	<p>Studies that do not report outcomes related to strategic alignment, decision-making, governance roles, value delivery, or performance tracking will be excluded.</p>	<p>Success must be defined at the portfolio level (maximizing collective value, managing risk, alignment) rather than merely individual project metrics (on-time, on-budget completion of a single component (Olsen et al., 2025). GL Specifics: Excludes 3rd Tier GL (e.g., tweets, short LinkedIn posts, or brief news blurbs) that provides insufficient data granularity to reach theoretical saturation (Garousi et al., 2019)</p>
Context	<p>Literature published before 2000 or not published in English.</p>	<p>Imposing a temporal limit of 2000 forward ensures focus on the most contemporary discussions regarding large-scale APM adoption and reconciliation, as many seminal APM frameworks gained widespread adoption more recently. Non-English sources are typically excluded in systematic</p>

reviews to manage data processing feasibility (Teixeira & Pedron, 2023)GL Specifics: Excludes sources where the producer's expertise or organizational affiliation cannot be verified (e.g., anonymous blogs), as these lack the outlet control necessary for doctoral-level evidence(Garousi et al., 2019)

Note. The size criterion was applied to the setting a source described. Section 3.4.2 explains how sources that do not report organisation size, or that describe smaller settings, were treated.

Appendix D: Literature Search Results

Tables D1 and D2 summarise the search results across the White Literature and Grey Literature streams respectively, showing records identified, removed, and retained at each stage of the PRISMA-aligned selection process.

D1: White Literature Search Results

WL Database Search Results: Records Identified, Removed, and Retained

Database	Records identified	Deleted	Duplicates removed	Snowballing / old search	Final unique records
IEEE Xplore	170	1 (language)	120	5	54
Scopus	187	0	77	23	133
ACM Digital Library	180	14 (conf. proceedings)	125	41	82
EBSCO	119	27 (trade publications)	64	46	74
Total	656	42	386	—	343

Note. ACM: 14 records for conference proceedings removed; individual conference papers were retained. IEEE: 1 record removed for language. EBSCO: 27 trade publication records removed.

D2: Grey Literature Search Results

Grey Literature Search Results: Records Screened, Excluded, and Retained by Platform

Platform	Records Screened	Redirected WL Stream	Excluded (Irrelevant)	Total Excluded	For Quality Assessment
Google (domain-filtered search)	50	17	0	17	33
Scaled Agile Framework (scaledagileframework.com)	50	0	6	6	44
PMI Disciplined Agile (pmi.org)	50	0	6	6	44
Atlassian (atlassian.com)	50	0	5	5	45
Thoughtworks (thoughtworks.com)	24	0	0	0	24
Total	224	17	17	34	190

Appendix E: Quality Assessment Instruments

Two distinct quality assessment instruments were used, reflecting the dual-stream nature of the MLR evidence base. White Literature was assessed against a 12-point academic checklist; Grey Literature was assessed using the AACODS framework.

E1: White Literature Quality Assessment Checklist (12-Point Scale)

Academic sources were assessed using a 12-point checklist adapted from Kitchenham et al. (2009). The checklist comprises six categories with two binary questions each (Yes = 1, No = 0). Sources scoring below 5/12 could be retained only if seminal, with limitations acknowledged.

White Literature Quality Assessment Checklist (12-Point Scale)

Category	Quality Assessment Question	Score
Authority & Credibility	C1. Is the source published in a peer-reviewed journal or conference proceedings?	0 / 1
	C2. Are the authors affiliated with a recognized academic or research institution?	0 / 1
Methodological Rigor	C3. Is the study design clearly described and appropriate to the stated research questions?	0 / 1
	C4. Are data collection and analysis procedures described in enough detail to assess soundness?	0 / 1
Empirical Basis	C5. Are findings grounded in primary or secondary data rather than unsupported assertion?	0 / 1
	C6. Is the evidence sufficient to support the claims the authors make?	0 / 1
Relevance to RQs	C7. Does the source directly address at least one of RQ1-RQ4?	0 / 1
	C8. Is the content directly relevant to APM governance in large-scale Agile environments?	0 / 1
Transparency	C9. Are inclusion/exclusion decisions or analytical choices made explicit?	0 / 1
	C10. Could the study be replicated or audited from the description provided?	0 / 1
Conclusions & Limitations	C11. Are conclusions adequately supported by the evidence presented?	0 / 1
	C12. Are limitations acknowledged and meaningfully discussed?	0 / 1
Inclusion threshold: / 12 ≥ 5 out of 12 points		

E2: Grey Literature Quality Assessment — AACODS Framework (6-Point Scale)

Grey literature was assessed using the AACODS framework (Authority, Accuracy, Coverage, Objectivity, Date, Significance), adapted from Garousi et al. (2019). The same instrument was applied by Zhao et al. (2024) in an analogous DevSecOps MLR at AUT.

AACODS Grey Literature Quality Assessment Framework (6-Point Scale)

Criterion Category	Definition	Score 1: Include	Score 0: Exclude
Authority (Source Credibility)	The evaluation focuses on the extent of expertise and the outlet control associated with the content produce (Garousi et al., 2019)	Score 1 if produced by a recognized professional body (e.g., PMI), a major framework developer (e.g., Scaled Agile Inc.), an established consultancy, or a verified practitioner expert with demonstrable APM credentials.	Score 0 if the source is anonymous, or the author or organization lacks demonstrable expertise in APM or large-scale Agile.
Accuracy (Transparency of Claims)	Accuracy is assessed based on the transparency of claims and the empirical grounding of the findings in the "actuality" of project-based management (Garousi et al., 2019; Stettina & Hörz, 2015)	Score 1 if claims about APM governance are supported by internal data, case examples, or explicit expert reasoning that the reader can assess.	Score 0 if claims are unsubstantiated assertions, anecdotal without context, or purely promotional without evidence.
Coverage (Contextual and Stakeholder Granularity)	Coverage ensures the source provides the thematic depth required to address the complexity of large organizational settings (Garousi et al., 2019; Stettina & Hörz, 2015)	Score 1 if the source provides context-rich detail directly addressing APM governance challenges, roles, frameworks, or practices relevant to at least one research question.	Score 0 if coverage is only superficial or tangential — a passing mention is not enough.
Objectivity (Bias Mitigation)	Objectivity filters the literature for vested interests and ensures a balanced presentation of the "lived experience" of practitioners (Garousi et al., 2019)	Score 1 if the source maintains at least some balance, distinguishing between what frameworks prescribe and what organizations	Score 0 if the source is purely promotional, strongly one-sided, or fails to acknowledge any trade-offs or constraints.

		actually experience in implementation.	
Date (Temporal Relevance)	This criterion ensures the literature captures the dynamic evolution of agile practices in volatile digital environments (Garousi et al., 2019)	Score 1 if the source reflects current APM practice (generally post-2015). Pre-2015 sources may score 1 if they report foundational contributions that remain relevant.	Score 0 if the source is clearly outdated and has been superseded by more recent framework versions or empirical evidence.
Significance (Conceptual and Prescriptive Utility)	Significance measures the novelty and actionable value of the source's contribution to the thematic architecture of the review (Garousi et al., 2019)	Score 1 if there is evident or plausible influence on the APM field: frequently cited, widely shared, or produced by central actors in the APM ecosystem.	Score 0 if there is little evidence of uptake or influence within the APM practitioner or academic community.
Maximum Score for Actuality	Inclusion threshold: $\geq$ 4 out of 6 points		

Appendix F: Quality Assessment Results

Tables F1 and F2 present the full quality assessment scores for all 23 White Literature sources and 18 Grey Literature sources included in this review.

F1: White Literature Quality Assessment Results

White Literature Quality Assessment Results (23 Sources, /12)

Source ID	Document Title	Authors	Score (/12)	Band	RQs Covered
EBSCO-19	Managing an Agile Developed IT-Project-Portfolio	Philipp, Rosenberger; Katharina, Struzl	12	High	RQ1–4
EBSCO-5	Steering the Sustainability Course of Innovation Portfolios	Müller, Leonie; Röth, Tobias; Spieth, Patrick	12	High	RQ1–4
EBSCO-8	Project Management and Business Modeling	HARAKE, M. F.	12	High	RQ1,2,4
EBSCO-RQ1-1	The Impact of PPM on Information Technology Governance	Reyck, Bert De ; Grushka-Cockayne, Yael ; Lockett, Martin ; Calderini, Sergio Ricardo ; Moura, Marcio ; Sloper, Andrew	12	High	RQ1,2
EBSCO-RQ1-2	Towards Successful Establishment of a PPM Office	Ershadi, Mahmoud; Jefferies, Marcus; Davis, Peter; Mojtahedi, Mohammad	12	High	RQ1–4
EBSCO-RQ1-7	Established Expectations for Artifacts in Agile PM	Alves Teixeira, Silvio Cesar; Drebes Pedron, Cristiane	12	High	RQ1–4
EBSCO-RQ1-12	Understanding Differences Between PPM Adopters/Non-Adopters	AJJAN, HAYA ; KUMAR, RAM L. ; SUBRAMANIAM, CHANDRASEKAR	12	High	RQ1–4
IEEE-03	Agile Projects in Non-Agile Portfolios	J. Bechtel; C. Kaufmann; A. Kock	12	High	RQ1,3,4

IEEE-10	Scalable Agile Frameworks in Large Enterprise PPM	E. D. Suárez-Gómez; C. A. Hoyos-Vallejo	12	High	RQ1,4
IEEE-13	Maturing the Scrum Framework for PPM	S. Vazifeh-Noshafagh; V. Hajipour; D. Di Caprio; F. J. Santos-Arteaga	12	High	RQ1–4
IEEE-47	How Successful Are Principles-Based PM Methodologies?	P. Svejvig; A. Kock; L. K. Hansen	12	High	RQ1,4
IEEE-48	Improving Project Management in Capital Market Regulators	K. Anam; A. Firman; A. A. Utama	10	High	RQ1,4
SCOPUS-RQ1-6	A Maturation Model for Project-Based Organisations	Jerbrant, Anna	12	High	RQ1,4
SCOPUS-RQ1-24	An Agile PPM Model for the Insurance Sector (APMI)	Dias, Vasco Franqueira, Tenera, Alexandra B.	12	High	RQ1–4
SCOPUS-RQ2-13	Reconciling Alignment, Efficiency and Agility in IT PPM	D., Hoffmann, David; F., Ahlemann, Frederik; S., Reining, Stefan	12	High	RQ1,3,4
Scopus-7	Agile PPM as a Strategic Enabler	Alves, Eder Junior; Gonçalves, Carlos A.	12	High	RQ1–4
Scopus-37	Control in Software Project Portfolios	Sweetman, Roger ; O'Dwyer, Orla; Conboy, Kieran	12	High	RQ1,3,4
Scopus-42	Small Software Organisations Need Explicit PPM	Vähäniitty, Jarno; Rautiainen, Kristian T.; Lassenius, Casper	12	High	RQ1,2
Scopus-60	Exploring Software Dev at the Very Large-Scale	Dingsøyr, Torgeir ; Moe, Nils B. ; Faegri, Tor Erlend; Seim, Eva Amdahl	12	High	RQ1–4
Scopus-119	Integrating Sustainability Metrics into PPM	Făgărășan, Cristian Codrut; Cristea, Ciprian; Cristea, Maria; Popa, Ovidiu; Pîslă, Adrian	12	High	RQ1–4

Scopus-128	When Agility Meets a Project Portfolio: Success Factors	Aghajani, Masoud ; Ahsan, Kamrul ; Whiteside, Naomi	12	High	RQ1–4
Scopus-164	Agile PPM: Empirical Perspective on Practice	Stettina, Christoph Johann ; Hörz, Jeannette	12	High	RQ1–4
Scopus-RQ1-33	PPM: Integrated Method for Resource Allocation	Zohar Laslo	12	High	RQ1,3,4

F2: Grey Literature Quality Assessment Results

All 18 Grey Literature sources scored the maximum six out of six on the AACODS framework, confirming that the grey literature evidence base meets the credibility threshold required for inclusion in doctoral-level synthesis.

Grey Literature Quality Assessment Results (18 Sources, /6, AACODS)

Source ID	Title	Organization / Platform	Score (/6)	Band	RQs Covered
GL-3-47	Why Portfolio Management?	PMI Disciplined Agile	6	High	RQ1,4
GL-3-48	Portfolio Management Workflow – External	PMI Disciplined Agile	6	High	RQ1,4
GL-3-49	Strategic Planning and Lean Portfolio Management	PMI Disciplined Agile	6	High	RQ1–4
GL-1-16	Agile Portfolio Management – Empirical Perspective	Association for Project Management	6	High	RQ1–4
GL-1-17	Accelerating Strategy Execution: Effective Portfolio, Program and Project Management	Centric Consulting	6	High	RQ1–4
GL-2-02	Lean Portfolio Management Discipline	Scaled Agile Inc.	6	High	RQ1,2,4
GL-2-18	Accelerating Business Value with SAFe® and Technology Business Management	Scaled Agile Inc.	6	High	RQ1–4
GL-3-06	SAFe: The Good, the Bad, and the Ugly	PMI Disciplined Agile	6	High	RQ1–4

GL-3-14	Disciplined Agile Portfolio Management Process	PMI Disciplined Agile	6	High	RQ1,3
GL-3-18	Portfolio Management of Enterprise Agility	PMI	6	High	RQ1–4
GL-3-20	Portfolio Management Practices	PMI Disciplined Agile	6	High	RQ1,4
GL-3-26	Lean Portfolio Management-Maximizing Value Across Many Programs	PMI Disciplined Agile	6	High	RQ1–4
GL-3-27	Portfolio Management Mindset	PMI Disciplined Agile	6	High	RQ1,4
GL-3-33	Innovation, Portfolio Management, and Agility as a Happy Family	PMI	6	High	RQ1–4
GL-3-46	Introduction to DA Flex	PMI Disciplined Agile	6	High	RQ1,2,4
GL-5-02	Portfolio Management in the Age of Digital Enterprises	Jim Highsmith & Natalie Hollier	6	High	RQ1–4
GL-5-06	Value-Driven Digital Business	David Robinson & Jim Highsmith	6	High	RQ1–4
GL-5-20	Is Your Governance Fit for Purpose?	Christopher Haas & Barton Friedland	6	High	RQ1–4

Appendix G: Data Extraction Instrument

Table G1 presents the data extraction template applied to all 41 included sources (23 WL + 18 GL). The completed extraction file is available in: MLR Documents/Assessment Spreadsheets/Inductive_Data_Extraction_MLR.xlsx.

Data Category	Details to Capture for Extraction	Rational/Links to RQs
Bibliographic Info	Author(s), title, publication year, source type (journal, conference, report, etc.)	Essential for contextualizing findings and validating inclusion criteria related to population (P). MLR requires an explicit distinction between theoretical and practitioner sources(Aghajani et al., 2023)
Study Context and Design	Industry domain, organization type, team/project scale, geographic location. Empirical study (e.g., case study, survey), conceptual/theoretical, literature review	Determines the reliability and rigor of the source and its generalizability to large-scale organizations (Hoffmann et al., 2020)
Main Objectives	The study's purpose or problem that it attempts to address	Determine significance to the current study
Adoption Necessity (RQ1 Focus)	Explicit statements justifying the adoption of formalized Project Portfolio Management (PPM) or Agile Portfolio Management (APM). Evidence that PPM is a critical driver for achieving organizational objectives, strategic alignment, maximizing resource usage, and overall business value (Hadjinicolaou & Dumrak, 2017; Olsen et al., 2025)	Isolates the "why" or the strategic imperative for adopting a portfolio-level perspective in LSASD environments.
Absence & Dysfunction (RQ2 Focus)	Empirical reports or critical analyses detailing negative consequences in the absence of formalized PPM. Specifically, evidence of ad hoc decision-making leading to positive or negative outcomes, misalignment, resource conflicts/overload, and politically motivated project selections ("pet projects") (Aghajani et al., 2023)	Addresses the systemic failures and inefficiency that motivate change, essential for establishing the problem domain.
Implementation Barriers (RQ3 Focus)	Specific obstacles encountered during the transition to or institutionalization of APM. For example, resistance to change (cultural/organizational)	Focuses on impediments and friction points, particularly where agile project practices clash with

	(Hadjinicolaou & Dumrak, 2017), lack of sustained senior management commitment (Hadjinicolaou & Dumrak, 2017), rigidity of formal PPM structures (Aghajani et al., 2023).	formal PPM governance requirements
Governance Structures & Practices (RQ4 Focus)	Prescriptive mechanisms and frameworks that support continuous alignment and agility	Captures the prescriptive solutions and effective practices for achieving the desired outcome of a reconciled APM configuration
Quality Score	As per the Study Quality Assessment checklist	This determines that the study is authentic and relevant to our study.

Appendix H: Three Governance Challenges of Large-Scale Agile and Corresponding Portfolio Responses

Challenge	Cause	Manifestation	Governance Response
Dependency Problem	Large-scale Agile creates complex webs of cross-team technical dependencies (shared services, API contracts, platform components, data model ownership).	Integration failures, conflicting priorities, and delivery bottlenecks when multiple teams share a codebase without portfolio-level dependency management.	Portfolio dependency tracking; cross-team synchronization cadences; dependency visualization boards.
Resource Contention Problem	Shared infrastructure, specialist capabilities, and capacity are finite. Without portfolio oversight, allocation defaults to political influence rather than strategic priority.	The 'resource paradox' every team simultaneously claims highest priority, producing no genuine prioritization. 61% of projects designated highest priority simultaneously (Hoffmann et al., 2020)	Lean Budget Guardrails; value-stream-aligned funding; portfolio Kanban; WSJF prioritization; explicit capacity management.
Strategic Alignment Problem	Autonomous team backlogs optimized locally do not automatically aggregate into a portfolio serving broader organizational strategy.	Strategic drift: investment flows towards locally rational but strategically incoherent initiatives. Connection between team delivery and enterprise strategy must be actively managed (Stettina & Hörz, 2015)	Portfolio-level Objectives and Key Results (OKRs); strategic portfolio backlogs; Lean Portfolio Management single-backlog ownership; regular portfolio-strategy alignment reviews.

Appendix I: Enterprise Agile Scaling Frameworks — Portfolio-Level Constructs

Dimension	SAFe (Scaled Agile Framework)	LeSS (Large-Scale Scrum)	Disciplined Agile (DA)
Portfolio construct	Lean Portfolio Management (LPM); Portfolio Kanban; Epic lifecycle management	Single Product Backlog across all teams; no distinct portfolio layer	Portfolio management layer; context-sensitive; integrates with PMI standards
Governance philosophy	Structured oversight with defined cadences, roles, and governance boards	Simplification; reduce organizational complexity; governance through less, not more	Toolkit (choose-your-WoW); situational awareness built into design
Budgeting model	Lean budget guardrails; value-stream funding; replaces annual project budgets	Minimal prescribed budgeting structures; product-level ownership implied	Flexible; integrates with existing PMI/PMBOK financial governance standards
Key portfolio roles	LPM team; Epic Owners; Lean Governance Board; Business Owners	Overall Product Owner; Area Product Owners (LeSS Huge); no portfolio-specific roles	Portfolio manager; Enterprise architect (optional); context-dependent roles
Prioritization method	Weighted Shortest Job First (WSJF): $(\text{Value} + \text{Time Criticality} + \text{Risk}) \div \text{Job Size}$	Team-level prioritization; minimal portfolio prioritization rules prescribed	Prioritization techniques vary by context; range of methods supported
Key strength	Most comprehensive portfolio governance; widely adopted globally; strong SAFe community	Radical simplicity; proven in single-product large-scale contexts; reduces overhead	Maximum flexibility; integrates classical and Agile approaches; PMI institutional backing
Key limitation	Prescriptiveness can create bureaucracy; cultural resistance common; high implementation cost	Limited guidance for multi-product portfolios; requires high organizational maturity	Less prescriptive guidance can create ambiguity; toolkit approach requires strong WoW decision-making
Empirical validation	Widely adopted; limited independent empirical evaluation of governance outcomes. Razzak et al. (2018) found that while team- and programme-level personnel adopted SAFe practices relatively effectively, portfolio-level personnel showed markedly lower adoption	Limited peer-reviewed empirical evidence at portfolio governance level	Primarily practitioner-oriented; peer-reviewed evidence sparse. Beecham et al. (2021) found that while DA and SAFe theoretically address almost all global software development risks, empirical evidence shows they eliminate only around half in practice, with some risks remaining irreducible

rates,(Razzak et al.,
2018)

regardless (Beecham et al.,
2021)

Appendix J: Definitions of White and Grey Literature Themes

This appendix defines the white literature (WL) and grey literature (GL) themes that were merged into the 16 merged themes reported in Chapter 4. Theme numbers and names follow the audit trail (MLR_Merged Themes for finding chapter.xlsx). Numbers follow the audit trail and are not consecutive. The extract count is the number of coded extracts assigned to the theme. The last column lists the merged themes (MTs) that each theme contributes to; Tables 4-1 to 4-4 show the contribution to each MT.

J1: Definitions of the White Literature Themes

WL theme	Definition	Extracts (n)	Merged themes
Theme 1: Adaptive Portfolio Governance	Captures mechanisms of iterative portfolio-level decision making and continuous re-prioritization that allow large-scale organizations to sense, respond to and implement changes in direction. Initial codes cluster around rolling-wave planning, market-driven re-prioritization, rigorous project termination, backlog-based decisions and dynamic investment criteria, positioning portfolio governance as an empirical and learning-oriented practice rather than a one-off selection exercise.	49	MT1.2, MT4.1
Theme 2: Agile-portfolio complexity management	Describes the additional coordination burden that iterative agile methods introduce when applied at portfolio scale. The theme captures the challenge of reconciling short iteration cycles, emergent scope, and multiple parallel agile teams with traditional portfolio-level planning and reporting expectations. No extracts were coded to this theme (it appears in the audit trail but not in Tables 4-1 to 4-4).	0	MT3.2
Theme 3: Capacity-Constrained Delivery Pressure	Encompasses the effort to align project demand with available delivery capacity so that the portfolio is neither overloaded nor idle. It draws on initial codes about effective resource allocation, capacity buffering, time/deadline pressure, multitasking, and balancing workload across heterogeneous projects, framing capacity as the pivot between strategic ambition and sustainable delivery.	27	MT1.3, MT2.2, MT3.3, MT4.5

Theme 4: Cross-level collaboration patterns	Covers recurring routines and communication mechanisms that knit together the portfolio, programme and team layers of a large-scale agile organization. The theme foregrounds frequent cross-level events, shared objectives, customer-facing communication and feedback loops as the connective tissue that keeps distributed teams aligned with portfolio intent.	21	MT1.4, MT2.2, MT4.5
Theme 5: Strategy-execution translation	Describes how portfolio management operationalizes abstract organizational strategy into concrete resource allocation, prioritization and backlog decisions. Initial codes center on strategic alignment, investment strategy, strategic backlogs and portfolio-level strategic clarity, positioning PPM as the translation layer between strategy formulation and delivery.	33	MT1.1
Theme 6: Customer-centric value delivery	Captures the continuous involvement of customers and end-users in portfolio decisions as a mechanism for ensuring market relevance and value realization. It also surfaces the negative variant: fragmented or low customer involvement that weakens value signals at portfolio level.	8	MT1.4, MT3.3, MT4.4
Theme 7: Decentralized execution patterns	Describes arrangements in which teams self-organize within portfolio-level strategic constraints, supported by backlog-based task pulling, OKRs, team synchronization and aligned autonomy. The theme situates empowerment as a structural feature of portfolio-level agility rather than a team-only practice.	13	MT1.4, MT2.2, MT4.3
Theme 9: Executive resistance to change	Captures senior leadership reluctance, fear of loss of control, and lacking sponsorship as an adoption barrier for agile PPM. The theme treats executive behavior as a cultural and political variable that can block or delay portfolio-level transformation even when operational teams are ready.	3	MT3.1
Theme 10: Institutional Process Incompatibility	Describes the friction created when pre-existing governance structures, annual budgeting cycles, mandated PPM methodologies and legacy artefacts do not fit with agile portfolio principles. Initial codes highlight alignment-with-existing-process challenges, inappropriate PPM methodologies, and governance-oriented PPM artefacts that persist despite an agile mandate.	11	MT1.5, MT2.2, MT3.2, MT4.2
Theme 11: Methodological	Captures coordination failure produced by disparate methods coexisting in the same portfolio (agile, sequential, hybrid) alongside	14	MT2.2, MT3.2

Fragmentation & Silos	organizational silos, disjointed governance and portfolio imbalance. The theme frames methodological pluralism as a source of structural rigidity rather than a managed trade-off.		
Theme 12: Organizational learning enablement	Describes PPM's role in enabling cross-portfolio knowledge generation, transfer and capability building. Initial codes span new knowledge generation, lack of knowledge sharing and dependence on stakeholder communication capability, pointing to the learning school's view of portfolios as integrators of dispersed understanding.	3	MT1.4, MT2.2, MT3.3
Theme 13: Perceived implementation barriers	Captures adoption frictions that are attitudinal or effort-based rather than structural: perceived implementation cost, project data quality concerns, difficulties adapting portfolio processes for agile, cross-level sequencing/tracking difficulty, and cost/efficiency worries around agile control. The theme explains why organizations delay or dilute PPM adoption even when benefits are clear.	7	MT2.2, MT3.3
Theme 14: Socio-Political & Cultural Resistance	Describes non-strategic influences that distort rational portfolio decisions, including political pressure, opportunist stakeholder behavior, entrepreneurial cultures, stakeholder resistance and complexity. The theme frames resistance as a socio-political phenomenon that interacts with governance standards rather than a pure change-management issue.	7	MT2.2, MT3.1
Theme 15: Portfolio complexity management	Describes the capability to steward heterogeneous and interdependent portfolios in volatile environments, covering interdependency management, interconnectivity, heterogeneous IT inventories and coordinated decisions across interrelated initiatives. It sits at the intersection of structural complexity and managerial attention.	27	MT1.4, MT2.2, MT3.2, MT4.6
Theme 16: Portfolio governance structures	Groups codes about the formal institutional architecture of PPM – portfolio vision owned by the PMO, strong portfolio managers, PPM review boards, investment decision authority, value-stream funding, governance control and effectiveness of PPM methodologies. The theme captures how governance is structurally embodied in roles, bodies and artefacts.	86	MT1.5, MT3.2, MT4.2
Theme 17: Portfolio	Describes organizational shortfall in the skills, knowledge and infrastructure needed for complex portfolio governance, including	8	MT2.2, MT3.3

management capability gap	ineffective management of multiple projects, limited literature/guidance and perceived limited applicability of standards. The theme frames capability as a precondition for PPM value realization.		
Theme 18: Systemic Risk & Technical Debt Accumulation	Captures the long-term accumulation of technical debt, short-term efficiency orientation, workarounds, legacy architecture degradation and aggregate risk of failure when portfolio pressure privileges quick wins. It conceptualizes risk and debt as emergent portfolio properties rather than individual project attributes.	8	MT2.2, MT3.3
Theme 19: Portfolio risk optimization	Describes the active balancing of risk and reward across the portfolio – balanced project risk, overall risk and reward analysis, PPM as a risk realizer, uncertainty management by the PMO and agile guardrails for risk and opportunity. The theme treats risk as a first-class portfolio decision variable.	7	MT1.2, MT4.4
Theme 21: Portfolio transparency and visibility	Captures holistic, centralized visibility of projects, resources and performance that enables informed resource allocation and strategic oversight. Initial codes include improved project visibility, global resource view, transparency of resources/work items, shared objectives and portfolio performance metrics.	18	MT1.3, MT4.4
Theme 23: Portfolio-Level Agility & Value	Describes PPM's role in extending agility beyond teams to organization-wide responsiveness, benefit realization and competitive capability. It brings together codes on responding to market changes, organizational performance, project value modularization, benefit realization and project prioritization into a single portfolio-value construct.	51	MT1.1, MT3.2, MT4.3
Theme 26: Reactive Resource Instability	Captures reactive patterns of resource allocation – unrest, lack of global resource view, resource misalignment, excessive multitasking, firefighting and schedule slippage. The theme frames these behaviors as symptoms of inadequate portfolio mechanisms rather than isolated delivery incidents.	12	MT2.2, MT3.3
Theme 29: Strategic ambidexterity tension	Describes the paradoxical tension between exploiting current capabilities and exploring emerging opportunities at portfolio level. Initial codes span ambidexterity challenge, agility-vs-stability tension, failure to balance exploration	8	MT1.4, MT3.2, MT4.6

	and exploitation, and misunderstanding of agile as destabilizing.		
Theme 31: Structural scalability barriers	Captures structural constraints that hinder scaling of agile methods to portfolio level, such as co-location assumptions and methods originally designed for small single teams. It reframes scalability as a structural-design problem rather than a willingness problem.	2	MT3.2
Theme 33: Value Leakage & Decision Failure	Describes the disconnection between strategic intent and executed portfolio decisions: failed strategy execution, ineffective decision making, lack of project prioritization, reduced ROI and inability to react rapidly. The theme locates value loss at the governance-execution interface.	12	MT1.5, MT2.1, MT4.2
Theme 36: Role & identity disruption	Captures uncertainty about shifting roles as agile teams absorb aspects of traditional project management (planning, coordination), particularly for middle managers. The theme treats identity work as a distinct barrier to agile portfolio adoption.	2	MT3.3
Theme 38: Distributed governance & accountability	Describes a distributed accountability model in which responsibility for outcomes is shared across roles (Product Owner, project manager, Scrum Master, business representatives) rather than concentrated in a single point. It contrasts with classical single-point accountability in traditional PPM.	1	MT4.2

Note. Definitions are taken from the sheet 'WL Theme Definitions (Refined)' in the audit trail. Total extracts = 438.

J2: Definitions of the Grey Literature Themes

GL theme	Definition	Extracts (n)	Merged themes
Theme 1: From Predictive Control to Empirical Steering	Practices that replace fixed, plan-based portfolio control with continuous reassessment of priorities against evidence, including adaptive planning and reassessment, economic steering with hypotheses, and synchronization of strategy with operations.	171	MT1.2, MT2.1, MT3.2, MT4.1
Theme 2: Operationalizing Flow & Capacity	Ways of managing portfolio work as flow within capacity limits, including flow-centric capacity management, structural and architectural integrity of the work, and granular value-based work units.	84	MT1.3, MT2.2, MT3.2, MT4.3
Theme 3: Strategic	Strategic stewardship that keeps operational work synchronized with strategy and spreads accountability for strategic outcomes, including	71	MT1.1, MT2.1, MT3.2, MT4.2

Resilience & Stewardship	strategic-operational synchronization, strategic value realization and systemic visibility.		
Theme 4: Behavioral & Institutional Anchors	Behavioral, cultural and institutional conditions that support or constrain agile governance, including framework rigidity and complexity, organizational cohesion and shared language, systemic visibility, and executive and socio-political friction.	88	MT1.4, MT2.2, MT3.1, MT4.3
Theme 5: The Financial Translation Layer	Ways of translating between delivery and financial vocabularies so that investment can be reallocated and audited against outcomes, including dynamic investment reallocation, standardized vocabulary, and financial literacy gaps.	20	MT1.1, MT3.3, MT4.4
Theme 6: Product-Centric Stewardship	Organizing portfolio governance around persistent product and value-stream ownership instead of temporary projects, including end-to-end ownership, persistent delivery structures and collaborative portfolio steering.	11	MT1.4, MT4.4
Theme 7: Algorithmic Governance	Use of data, metrics and analytical models to inform portfolio decisions, including economic trade-off logic, predictive impact analytics, proxy-based steering and the risk of metric manipulation.	13	MT1.2, MT2.1, MT4.4
Theme 8: Relentless Operational Excellence	A continuous-improvement orientation in portfolio governance, including Kaizen-based governance, empirical spend efficiency, and the risk that activity is valued over outcomes.	10	MT1.3, MT2.2, MT3.3, MT4.5
Theme 9: Paradox Management	Treatment of tensions in portfolio governance as paradoxes to be managed, including dialectical governance, ambidextrous strategy execution and pragmatic delivery equilibrium.	7	MT1.4, MT3.2, MT4.6
Theme 10: Empirical Learning Culture	Organizational learning practices that validate outcomes empirically, including empirical validation, outcome-validated governance gates, perpetual value validation and knowledge capital growth.	10	MT1.2, MT2.2, MT4.1

Note. Definitions were written from the refined codes assigned to each theme in the audit trail (sheet 'GL Coded Extracts', Step 2). Total extracts = 485.

Appendix K: Coded Extracts Illustrating the Four Tensions in Section 4.7

Table K1 lists coded extracts that illustrate each pole of the four tensions reported in Section 4.7. The tensions were formed after the 16 merged themes had been set, by reading the extracts and merged themes together. The extracts below were selected from the audit trail afterwards to show the basis of each pole. They illustrate the poles and are not a count of the evidence for a tension. An extract can illustrate more than one pole. Source IDs and row numbers refer to the sheets 'WL Coded Extracts' and 'GL Coded Extracts' in the audit-trail workbook (MLR_Merged Themes for finding chapter.xlsx).

Table K1:
Coded extracts illustrating the poles of the four tensions

Tension	Pole	Source ID	Merged theme	Initial code	Audit-trail row
Centralization and decentralization	Centralization (portfolio-level authority)	SCOPUS -RQ2-13	MT4.2	Strong Portfolio Managers	WL row 55
Centralization and decentralization	Centralization (portfolio-level authority)	EBSCO-RQ1-2	MT4.2	Centralized portfolio monitoring	WL row 309
Centralization and decentralization	Centralization (portfolio-level authority)	EBSCO-RQ1-12	MT4.2	Effective Data governance	WL row 147
Centralization and decentralization	Decentralization (team autonomy)	Scopus-164	MT4.3	Empowering Agile Teams	WL row 28
Centralization and decentralization	Decentralization (team autonomy)	SCOPUS -RQ1-24	MT4.3	OKRs Method for Team Autonomy	WL row 219
Centralization and decentralization	Decentralization (team autonomy)	GL-3-49	MT4.3	Decentralized Decision-Making	GL row 102
Structure and adaptability	Structure (formal architecture)	EBSCO-5	MT4.2	Clear roles and agile boundary structures	WL row 340
Structure and adaptability	Structure (formal architecture)	Scopus-119	MT4.2	Effective portfolio governance	WL row 423
Structure and adaptability	Structure (formal architecture)	IEEE-47	MT1.5	Project performance and PPM formalization	WL row 288

Tension	Pole	Source ID	Merged theme	Initial code	Audit-trail row
Structure and adaptability	Adaptability (flexible steering)	EBSCO-5	MT4.1	Dynamic reprioritization of projects	WL row 342
Structure and adaptability	Adaptability (flexible steering)	GL-3-33	MT4.1	Agility for strategic alignment	GL row 430
Structure and adaptability	Adaptability (flexible steering)	GL-3-26	MT4.1	Effective Prioritization and Adaptability	GL row 147
Value and control	Control (formal and diagnostic control)	Scopus-37	MT4.2	Governance control	WL row 103
Value and control	Control (formal and diagnostic control)	EBSCO-5	MT4.2	Early warning and non-performing projects	WL row 343
Value and control	Control (formal and diagnostic control)	EBSCO-RQ1-12	MT4.2	Effective Data governance	WL row 147
Value and control	Value (value-based review)	GL-5-02	MT4.1	Value based Prioritization	GL row 278
Value and control	Value (value-based review)	GL-1-17	MT4.4	Value-Based Prioritization and Scoring Models for Decision Making	GL row 481
Value and control	Value (value-based review)	EBSCO-8	MT4.1	Agile Methodologies-Shift from Predictive to Adaptive	WL row 79
Value and control	Value (value-based review)	GL-3-33	MT4.1	Agility for strategic alignment	GL row 430
Speed and rigor	Speed (fast decisions and delivery)	GL-5-02	MT4.1	Incremental Speed to Market	GL row 287
Speed and rigor	Speed (fast decisions and delivery)	GL-3-27	MT4.1	Maximizing value by shorter time to market	GL row 50
Speed and rigor	Speed (fast decisions and delivery)	GL-5-06	MT4.1	Envision-Evolve approach	GL row 390

Tension	Pole	Source ID	Merged theme	Initial code	Audit-trail row
Speed and rigor	Rigor (validation and formal review)	SCOPUS -RQ2-13	MT4.1	Rigors Project Termination	WL row 57
Speed and rigor	Rigor (validation and formal review)	EBSCO-5	MT4.2	Early warning and non-performing projects	WL row 343
Speed and rigor	Rigor (validation and formal review)	GL-3-26	MT4.1	Evidence-Based Progress Reporting	GL row 140
Speed and rigor	Rigor (validation and formal review)	GL-3-27	MT4.1	Risk Based Governance, not artefacts based	GL row 55

Note. WL = white literature; GL = grey literature. The poles of the third and fourth tensions are the researcher's interpretation of these extracts (Section 4.7); none was coded as a statement of the tension itself.