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An exploration of agile government in the public sector: A systematic literature review at macro, meso, and micro levels of analysis

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ABSTRACT

Originating from private sector software development, agile has permeated the public sector, fostering innovative reforms not just in project management but also in organizational management and collaborative governance. Despite its widespread adoption, there exists a paucity of research delving into the intricacies of agile practices, particularly for the potential conflicts and interactions with the traditional waterfall-based approaches. Employing the Preferred Reporting Items for Systematic reviews and Meta-Analyses (PRISMA) method, this systematic review aims to address three fundamental research questions concerning the conceptualization, implementation, and impacts of agile government. To deepen theoretical insight and practical application, our study classifies agile into three distinct levels: Micro (project management), Meso (organizational management), and Macro (governance structure). Our analysis uncovers substantial variations in agile practices across these levels, reflecting a deliberate strategy aimed at harmonizing with existing bureaucratic systems. This study concludes by offering policy implications and delineating avenues for future research endeavors.

1. Introduction

Agility in the public sector is not a novel concept. Within the era of Weberian bureaucracy and Scientific Management, Finer's (1936: 583) argument about the ideal government emphasizes the importance of "inventiveness, agility, and fruitful administration" that can be achieved through enhanced internal discipline or other forms of political control. This interpretation conflicts with contemporary perspectives, which requires a new interpretation associating public organization agility, innovativeness primarily, and risk tolerance (Mergel, 2016). Internally, the post-NPM reliance on outsourcing has reduced the government's capacity to manage large-scale technology innovation projects (Mergel et al., 2018). Externally, the rapid advancement of digital technologies, such as big data analytics and internet of things (IOT), has fundamentally transformed the landscape of public administration. Particularly, the digital transformation of the post-pandemic era and the evolution of generative artificial intelligence (AI), have both introduced new complexities and opportunities for public sector organizations, demanding greater adaptability, real-time decision-making, and innovative service delivery models (Androniceanu, 2024; Chatfield & Reddick, 2018; Moser-Plautz & Schmidthuber, 2023; Salah et al., 2023; Wirtz et al., 2019). The greater expectation of stakeholder involvement associated with the increasingly complex dynamics of policymaking or service delivery processes (Head, 2008) also requires a user-centric approach rather than a traditional waterfall method. Thus, the concept of agile government, originating from software development practices in the private sector (Johannessen, 2025),[1] has evolved from a focus on improving project management adaptability to encompassing broader public sector transformations and has gained increasing attention (Mergel et al., 2018; Soe & Drechsler, 2018).

Despite growing interest in agile practices, however, the development of agile government has been limited by fragmented literature and

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[1] Originating in software development, agile in the private sector is conceptualized as a dynamic, iterative, and collaborative framework designed to enhance organizational flexibility and responsiveness in fast-changing and complex environments (Anifa et al., 2014; Serrador & Pinto, 2015). Often implemented using a "timeboxing" technique, agile breaks complex projects into fixed time intervals to ensure focused progress: methodologies such as Scrum and Kanban prioritize adaptive planning, short development cycles, cross-functional collaboration, and ongoing stakeholder feedback (Anifa et al., 2024; Grapenthin et al., 2015). These practices aim to reduce time-to-market, improve product quality, and increase customer satisfaction by promoting continuous learning and timely adjustments (Anifa et al., 2024; Balog, 2020; Dong et al., 2024).

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case-bound understandings that remain unintegrated (Mergel et al., 2018; Soe & Drechsler, 2018). Agile government stem from various practical implementations but often lack a shared theoretical foundation, particularly when adopted in the public sector where rigid hierarchies and control-based regulations may conflict with agile principles such as flexibility and decentralization (Lappi & Aaltonen, 2017). Furthermore, agility has been used to describe a wide range of applications, including project management techniques (Bogdanova et al., 2020), organizational practices (Saeed et al., 2022), and systematic governing structure (Janssen & Van der Voort, 2020). This broad application has led to conceptual ambiguity and inconsistent terminology. As a result, key research gaps remain in the field: there is limited synthesis of conceptualizations across levels, insufficient comparative analysis of implementation challenges and enabling factors, and a lack of empirical evidence on the public sector impacts of agile adoption (Ylinen, 2021). These research gaps not only hinder theory development but also restrict subsequent examinations of the antecedents or impacts of agile approaches in government settings. Similarly, from a practitioner's viewpoint, without clear examination of agile approaches at different levels or in various scenarios, translating research findings into practical policy implications becomes challenging, especially considering the differences between the public and private sectors.

A systematic literature review (SLR) is particularly well-suited for these research gaps, as it enables the rigorous identification, evaluation, and synthesis of existing research, reducing bias and enhancing transparency. Especially, this study categorizes agile government implementation into three distinct levels: micro, *meso*, and macro (Fischer & Neumann, 2024; Hong & Kim, 2020; Tai, 2021), offering a different approach from earlier literature review studies. This multidimensional framework clarifies how agility is employed across different contexts by distinguishing between project-based techniques, organizational development practices, and broader governing structures. Following the Preferred Reporting Items for Systematic Review and Meta-Analyses (PRISMA) method (Liberati et al., 2009; Page et al., 2021), a total of 55 peer-reviewed journal articles were identified as of May 2023 and included for the final in-depth analysis.

This review is guided by three research questions:

(1) How has agility been conceptualized within the context of the public sector?
(2) How has agile government been implemented in public sector settings, and what antecedents or challenges have been identified?
(3) What impacts of agile government in the public sector have been reported in the literature?

These questions not only structure the analysis but also frame the theoretical discussion on the feasibility of agile in the public sector. By linking each level of analysis to implementation dynamics, the review highlights how context influences both opportunities and limitations in adopting agile approaches.

This study begins by outlining the methodological settings in the subsequent section, covering eligibility criteria and the coding process. Subsequently, it presents descriptive results from the systematic literature review, focusing on publication trends and employed research methods. The primary research findings are then detailed to address three research questions concerning the conceptualization, implementation, and impacts of agile government approaches. Finally, the paper offers synthesis interpretations and discussion, followed by a conclusion and future research agenda.

2. Methodology and eligibility

The Preferred Reporting Items for Systematic Review and Meta-Analyses (PRISMA) methodology was employed in this research. PRISMA is known for its transparent guidelines concerning the determination of eligibility criteria, paper identification, and reporting of research findings, which enhances the reliability and accuracy of potential findings (Cooper et al., 2018; Liberati et al., 2009; Page et al., 2021). Given that the listed research questions are heavily embedded in a systematic review of contemporary studies, the PRISMA method is most suitable for presenting prior research findings by categorizing and comparing both managerial practices and theoretical perspectives across different groups and levels. Following the PRISMA 2020 statement (Page et al., 2021), the subsequent section describes the items pertaining to the methodological approach.

2.1. Identification and search strategy

To ensure comprehensive coverage, multiple electronic searches were conducted across three major social science databases: Web of Science, EBSCOhost, and ProQuest Social Science Premium. Database coverage spanned all available years up to the date of the last search in May 2023.

For each database, a systematic search strategy was developed using three keyword combinations—("agile" AND "government"), ("agile" AND "governance"), and ("agile" AND "public")—applied to titles, abstracts, and author-identified keywords. Articles were identified if any of these combinations appeared in the searchable fields, ensuring representation of both direct and broader conceptualizations of agile approaches in the public sector.

Additionally, to capture the breadth of agile's application in the public sector, the search was not restricted to public administration journals. Relevant articles were also retrieved from adjacent disciplines, including health management, business management, and information science. While this strategy broadened the scope, it may also introduce interpretive challenges due to differing ontological and epistemological traditions across fields.

In total, the search produced 527 results from ProQuest Social Science Premium, 405 from Web of Science, and 170 from EBSCOhost, yielding 1102 records. After removing duplicates, 675 unique articles remained. An initial title and abstract screening was conducted by two investigators to confirm relevance to both agile practices and the public sector. This first-round screening reduced the pool to 564 articles for further eligibility assessment.

A summary of the identification and screening process is presented in Fig. 1, following the PRISMA 2020 flow diagram.

2.2. Eligibility criteria

The second-round screening process assessed the eligibility of each record in accordance with PRISMA principles. Clearly defining eligibility criteria is essential to enhance transparency, ensure reproducibility, and improve the predictability of systematic review outcomes (Liberati et al., 2009; Rethlefsen et al., 2021). Two sets of eligibility criteria, both topical and technical, were applied.

Topical criteria. Agile was treated as a managerial approach to project management that has been widely recognized in software development and manufacturing R&D in the private sector (Gunasekaran, 1999) and later applied in the public sector for its flexibility and adaptability (Janssen & Van der Voort, 2020; Mergel et al., 2021). To reflect this feature, a study was considered eligible if it examined the application of agile in the public sector, whether in innovation, service delivery, or governance contexts. During the screening, the abstracts were carefully reviewed to ensure that the term "agile" was not being used only as a general adjective to describe public organizations without linking it to managerial practices or governing structure. Sources that fell into this category were excluded.

Technical criteria. Only English-language and peer-reviewed journal articles were included. Limiting the review to English-written articles reflected both the dominance of English in academic publishing and the language competency of the research team. Although focusing on peer-

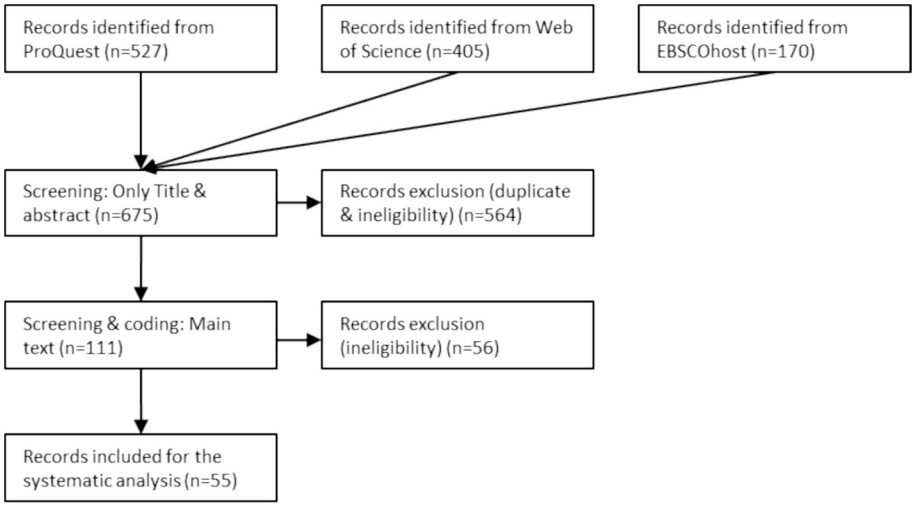

Fig. 1. PRISMA flowchart.

reviewed journals may have excluded relevant studies or grey literature such as book chapters, dissertations, and conference papers, this decision ensured the accuracy, quality, and reliability of the references included in the review (Cooper et al., 2018; Reiter & Klenk, 2019; Ruijer & Martinius, 2017). No publication year restrictions were applied; however, the earliest eligible article dated back to 2002, corresponding with the early diffusion of the agile approach into the public sector.

Additionally, no methodological criteria were imposed in this screening process. This review also aimed to capture both empirical and theoretical contributions and to incorporate studies employing quantitative and qualitative methods. Addressing both conceptual and practical dimensions was essential to understand how agility has been defined, operationalized, and challenged in public sector contexts.

Based on the above topical and technical criteria, two principal investigators independently reviewed the titles, abstracts, and author-identified keywords of each record to ensure the eligibility. Discrepancies were resolved through discussion, and only sources meeting all topical and technical requirements were retained. After this round of screening, the pool of 564 records was reduced to 111 articles for full-text analysis, as shown in Fig. 1.

2.3. Review method and coding

Out of the 111 peer-reviewed articles retained for full-text review, eligibility was reassessed in line with PRISMA guidelines (Cooper et al., 2018; Liberati et al., 2009; Page et al., 2021). This stage involved a careful review of the main text to determine whether "agile" was contextualized as a managerial practice or governing feature. Articles that mentioned "agile" only in passing or as an objective descriptor, without managerial or governance implications, were excluded. For example, studies referring to "agile manner" in the context of public service provision or communication during the COVID-19 pandemic, without linking the term to management practices, were not included. Two principal investigators independently reviewed the full texts, compared their judgments, and resolved any differences through discussion. Ultimately, 55 articles were included for systematic analysis. The full identification and screening process is summarized in Fig. 1, which follows the PRISMA 2020 flow diagram (Page et al., 2021).

For the synthesis stage, a data extraction spreadsheet comprising 27 items was developed, based on three research questions. The framework for this extraction is provided in Table 1. These items were coded independently by two principal investigators and two research assistants. After coding the first ten articles, the team held a calibration meeting to address ambiguities and refine the coding approach. Disagreements were resolved through discussion, and all decisions were documented to ensure auditability. This procedure strengthened the reliability and reproducibility of the data extraction and synthesis, consistent with best practices for systematic reviews.

3. Descriptive results of the systematic review

This section provides a comprehensive overview of the collected eligible articles, focusing on publication trends and descriptive results. Firstly, concerning publication journals, the 55 eligible articles were dispersed across 44 different journals. This indicates significant interest in the academic community regarding the issue of agile approach, with many journals publishing related papers. However, it is noteworthy that only 5 journals published more than one research article, as depicted in Table 2. This suggests both a highly dispersed publication landscape and an indication that the overall research and practice of agile approach remain relatively immature since the first literature review paper was published in 2018 (Mergel et al., 2018). For instance, *Government Information Quarterly* (GIQ) published 6 eligible papers, while the *International Journal of Information Management published* 4.

Furthermore, it is apparent that similar research tends to be published in journals encompassing public management (e.g., *Public Management Review*), information science (e.g., *Information Technology & Management*), and business administration (e.g., *Strategic HR Review*). Analyzing the disciplines of these eligible papers (as depicted in Table 3), this study found that approximately 47 % were published in public management-related journals, 29 % in technical-based journals of information science, and 9 % in journals of business administration or management. This distribution not only reflects the research interests of this study but also underscores the fact that the methodology of agile approach/methodology applied in the public sector originated in the private sector and the innovation process of information technology.

Secondly, a timeline of annual publications (see Fig. 2) demonstrates a clear surge in research on agile government after 2016, with nearly half (49 %) of all eligible papers published since 2020. This trend aligns with the rise of urban innovation initiatives (e.g., smart-city pilots or open data platforms) that demanded more adaptive and responsive governance models. Since 2020, nearly half (49 %) of all eligible articles have appeared, driven by two major catalysts: the sudden shift to online service delivery during the COVID-19 emergency and, more recently, the proliferation of generative AI tools in government operations (from predictive analytics to conversational chatbots). These trends underscore that agile government has transitioned from a niche concept to a dynamic, fast-evolving field in the last five years. The timeline also highlights a research gap for government's iterative practices in earlier years, indicating that systematic attention to agile in the public sector is

Table 1
Extraction materials of the coding process.

Category	Codes	Explanation
Article information	Title Authors Publication year Journal's discipline	The analysis of publication trends involves coding the basic information of each article.
	Keywords	All author-identified keywords are recorded and grouped to analyze research trends.
	Abstract	The eligibility judgment is based on collecting the abstract of each article.
Research settings	Research question	The research question of each article is extracted from either the abstract or introduction section, categorized into three potential groups: (1) antecedent analysis, (2) operational analysis, and (3) influence analysis.
	Research method	The research method of each article is recorded based on the methodological description, with two steps of grouping: (1) Approach: empirical, theoretical, or literature review, and (2) Method: quantitative, qualitative, or mixed methods.
	Geographic context	For empirical articles, the geographic context of the selected case is recorded and grouped.
	Public organizations	For empirical articles, the background of the selected case is recorded to identify the level of government involved.
	Theoretical basis	Any theoretical basis employed by empirical studies or conceived theoretical frameworks from non-empirical studies is recorded.
	Research topic	The research topic of each article is recorded, specifying where agile methodology is implemented (e.g., tax administration or performance management).
	Managerial activities	Additionally, managerial activities associated with the implementation of agile methodology are identified.
Research findings	Definition of agile	The definition of agile methodology provided by each article, if any, is recorded and grouped for conceptualization research questions.
	Antecedents of agile methodology	Descriptions/findings related to the antecedents enabling the adoption of agile methodology are recorded.
	Operational Challenges/enablers	Descriptions/findings related to optional challenges or enablers during implementation are documented.
	Impacts of agile methodology	Descriptions/findings regarding how agile methodology influences examined public organizations are recorded.
	Connection to leadership	Lastly, descriptions regarding the role of leadership during the adoption or implementation of agile methodology are noted.

Table 2
Journals with most publications of agile government.

Journals	Published eligible papers
Government Information Quarterly	4
International Journal of Information Management	2
Public Administration Review	2
International Public Management Journal	2
Information	2

a recent phenomenon.

Thirdly, concerning the research approach (as depicted in Fig. 3 and Table 4), it is evident that the majority (80 %) of the 55 eligible papers prefer an "empirical" examination of the topic of agile approach.

Table 3
Disciplines of publication.

Disciplines	Number of eligible papers	Percentage
Public management	26	47 %
Information science	16	29 %
Business administration or management science	9	16 %
Education	1	1.8 %
Health management	1	1.8 %
Others	4	7.3 %
Total	55	100 %

Conversely, only 11 % of eligible papers are dedicated to theoretical discussions, while 4 % are literature review studies. Notably, the vast majority of empirical studies use qualitative approaches—such as interviews, case study, document analysis, or participatory observation—raising concerns about the generalizability, external validity, and associated theoretical development. This methodological imbalance is a recognized limitation in the field and highlights the need for more quantitative and mixed-methods research to strengthen the evidence base for agile government.

In short, the diversity of disciplines and journals, along with prevailing methodological trends, highlights both the interdisciplinary nature of agile government research and its early stage of theoretical development. The predominance of qualitative case studies, coupled with the dispersed publication landscape, suggests that the collected literature is still in the process of converging around shared frameworks and definitions.

4. Research findings of the systematic literature review

4.1. The conceptualization of agile in the public sector

The first question addressed in this review concerns how agility has been conceptualized in the public sector. Conceptualization involves defining abstract ideas in clear, operational terms by identifying core components, distinguishing them from related constructs, and specifying boundaries and dimensions. This process is essential for building a shared understanding and ensuring consistency across studies.

In the context of agile government, conceptual clarity is particularly important. The term "agile" originates from private-sector software development[2] but now encompasses a wide range of meanings in public administration (Mergel et al., 2018). Without a clear and consistent definition, it could risk conflating diverse interpretations, creating theoretical ambiguity and limiting the practical utility of findings.

Clarifying how agile is conceptualized is also central to this review's overarching goal on assessing the implementation from a practical perspective. Since the implementation of agile government depends on how agility is defined in a given context (Neumann, Kirklies, & Schott, 2024; Pinho et al., 2022), vague or inconsistent definitions can lead to misaligned expectations or superficial adoption. Rigorous

[2] In the private sector, agile was initially interpreted as a set of method-based techniques for software development, emphasizing the ability to deliver incremental value while responding quickly to evolving demands (Lee & Xia, 2010). Over time, the concept has expanded into broader organizational applications such as agile project management, agile leadership, and enterprise agility (Anifa et al., 2024; Dong et al., 2024). These developments reflect a shift toward decentralized decision-making, team empowerment, and sustained value creation, helping organizations adapt to technological disruption and operational uncertainty (Baxter et al., 2023; Conforto et al., 2014; Serrador & Pinto, 2015). Empirical studies and systematic reviews consistently show that higher levels of agile adoption are associated with improved project performance and stronger stakeholder engagement (Anifa et al., 2024; Lee and Xia, 2010; Serrador & Pinto, 2015).

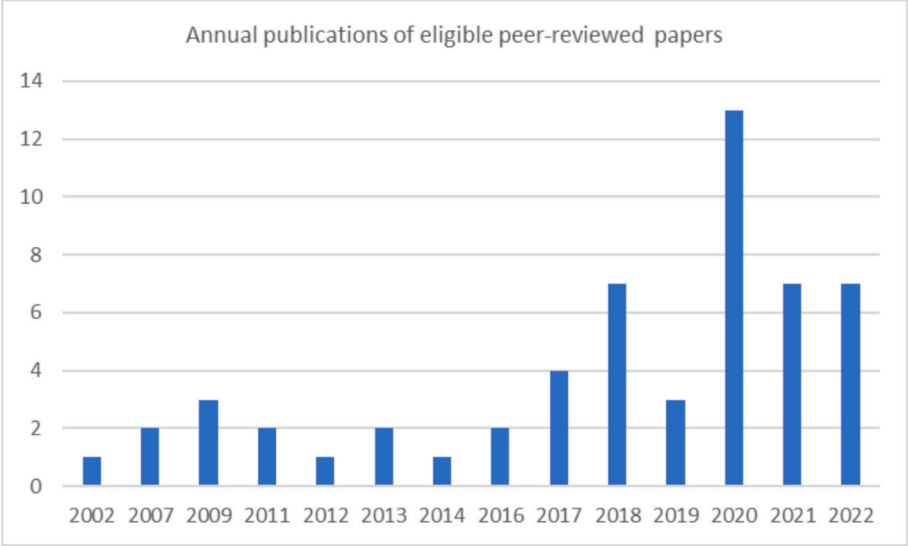

Fig. 2. Annual publications of eligible peer-reviewed papers.

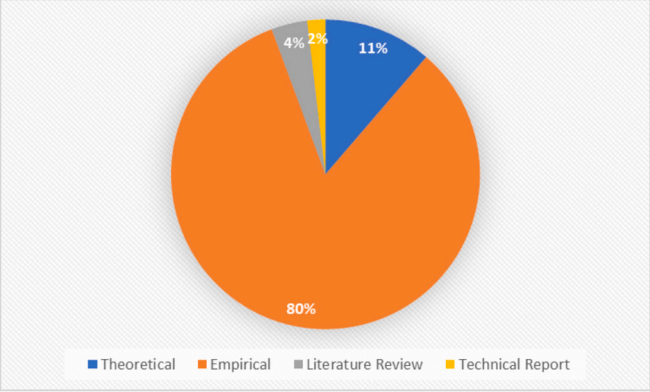

Fig. 3. Research types of eligible papers.

Table 4
Research methods of eligible papers.

Methods	Frequency	Percentage
Case study	27	49.1 %
Interview/Semi-structure interview	20	36.4 %
Document/content analysis	15	27.3 %
Literature review	12	21.8 %
Observation/Participatory observation	10	18.2 %
Regression/OLS regression	7	12.7 %
Survey/Descriptive statistics	3	5.5 %
Theoretical development	3	5.5 %

conceptualization, therefore, is not only foundational to theoretical development but also critical for evaluating the conditions under which agile applications can succeed (Fischer & Neumann, 2024). Thus, this study adopts a multi-dimensional framework (Fischer & Neumann, 2024; Hong & Kim, 2020; Mergel et al., 2018) to examine the conceptualization of agile government across different levels. The definitions of this multidimensional framework are present in the following table and will be explained in the following sections (Table 5).

4.1.1. Agile methodology (micro-level)

At the micro level, our review finds that the agile has been conceptualized primarily as general technical approach (also called Scrum) which is typically used by project management or software development

Table 5
Agile conceptualization at three levels.

Level	Term	Definition
Micro-level	Agile Methodology	Focuses on project-level work. At this level, agile is treated as a technical method involving iterative development, sprint cycles, and regular feedback to manage tasks. It is commonly applied in software development projects.
Meso-level	Agile Management	Refers to the organizational level. Agile is viewed as a management approach that applies its principles to leadership, policy reform, and internal process improvement, promoting experimentation, risk tolerance, and innovation in public service.
Macro-level	Agile Governance	Involves the institutional or system-wide governance. Agile values are used to inform adaptive governing structures that emphasize collaboration across stakeholders, iterative policymaking, and responsiveness to complex and time-sensitive societal issues.

teams. Agile methodology involves an iterative process by breaking down projects into smaller incremental and manageable phases called "sprints" where cross-functional project teams work together to evolve solutions using frameworks like Scrum (Bogdanova et al., 2020). This foundational conceptualization distinguishes agile from the traditional "waterfall" model, which follows a sequential and fixed plan. In contrast, the agile approach recognizes evolving and incremental requirements over time (Karagoz et al., 2016). Specifically, Agile methodology utilizes small sprints to enable the integration of user feedback to quickly respond to the user needs. It provides an approach to assimilation of the user requirements into the software development process. This allows project teams to track progress, provide timely feedback, and make any necessary adjustments (Bogdanova et al., 2020). The continuous iterations and short cycles reduce risk because work functionality can be divided into each small sprint rather than completing everything at once. This iterative nature is a key element in how agility is conceptualized at the micro level.

In this literature review, a category of articles (10 in total) examines how agile approaches have been utilized to facilitate the software development process or IT systems within the public sector. This type of research often highlights the practical and technical conceptualizations of agile methodology, ranging from the implementation of scaled agile frameworks to procurement practices, organizational communication, and stakeholder involvement (Lappi & Aaltonen, 2017; Patanakul &

Rufo-McCarron, 2018). For instance, an agile development approach known as Rapid Application Development (RAD) was employed in a large-scale technical system design project in the UK public sector (Berger & Beynon-Davies, 2009), while another study explored how agile methodology could aid in creating a Visual Analytic System (VAS) for innovative mobility infrastructures within a smart-city project (Faber et al., 2018).

A second group of studies reflects a broader conceptual shift, where agile methodology is adapted from software development to general project management. For instance, agile methodology techniques such as Scrum were transformed and applied to a policy development project within a New Zealand government agency (Mirzaei & Mabin, 2017). Similarly, a hybrid agile organizational model with various stakeholder roles was proposed to overcome the inherent limitations of conventional project management in local self-government units in Croatia (Marović & Bulatović, 2020). These studies contribute to expanding the conceptual boundaries of agile beyond technical applications software development, framing it as a flexible managerial approach of a specific project.

A common feature of these studies at this level is the expectation that an agile methodology will improve project management practices through unique project cycles (Sprints) and managerial processes such as mutual adjustment, rapid coordination, and interactive communication, to better address potential risks and uncertainties (Mirzaei & Mabin, 2017; Zwikael, 2020). Agile-based project management emphasizes iterative and incremental project development to enhance responsiveness and flexibility in uncertain situations. This emphasis on adaptability and feedback loops reflects a core component in the evolving conceptualization of agility at the project level. Similar transformations of agile methodology can also be observed in the public sector's temporary response to emergencies like the COVID-19 pandemic (Nazir et al., 2022) or the challenges of open digital service innovation in the fuzzy front end (Tate et al., 2018).

As work environments are rapidly becoming more complex due to constantly emerging challenges and new technologies (i.e., Generative AI), the need for agility and streamlining of the bureaucratic processes is pronounced both in the private and public sectors. Utilization of agile methods decreases the burden of team contracting and reduces the amount of paperwork involved in the initial project phase. It allows project management teams to achieve a sense of purpose and align themselves with the team and organizational vision. At the micro-level, agility is often conceptualized as a means of enabling collaborative problem-solving, real-time feedback, and relationship-building. These dynamics facilitate knowledge sharing, support integration across teams, and encourage organic solutions to complex technical issues (Karagoz et al., 2016).

In summary, the conceptualization of agile methodology at the micro level is multifaceted, as it originates from technical processes but is increasingly framed as a flexible, iterative, and collaborative approach to public project management.

4.1.2. *Agile management (meso-level)*

Agile management is conceptualized as the application of agile principles at the organizational level (as shown as Fig. 4), extending beyond project-specific practices to leadership, process improvement, and policy reforms across government institutions (Mergel, 2016). This conceptualization reflects a shift from project-level practices to broader organizational structures and development, including procurement, human resources, program management, and executive leadership. The aim is to promote responsiveness and innovation in public service delivery by replacing traditional "waterfall" models with iterative, feedback-driven approaches grounded in regular citizen input. For instance, one conceptual entry point is through HR policy reforms that promote purpose, autonomy, and motivation among public servants (Karagoz et al., 2016). In this view, agile is no longer confined to project workflows but is conceptualized as an organizing principle for public institutions. Rather than emphasizing rigid frameworks like Scrum, this approach focuses on how core agile values (i.e., flexibility, iteration, and collaboration) are integrated into routine management practices (Kiruba et al., 2020; Nuottila et al., 2016).

Within this strand, one group of studies explores how agile is conceptualized as a set of techniques supporting core management functions, such as planning, organizing, directing, and controlling public sector resources. For example, a study of the Victorian Public Sector in Australia illustrates how agile practices enhance knowledge management within ICT environments through informal, iterative interactions (Karagoz et al., 2016). Similarly, research on Philippine central government agencies shows how agile management has been incorporated into performance evaluation systems such as the Strategic Performance Management System (Torneo & Mojica, 2020). These studies contribute to a conceptual framing of agile management as a tool for improving day-to-day administration.

Another group of studies focuses on organizational development, examining how agile practices facilitate structural change and long-term capacity building. In this view, agile is not just a managerial technique but a guiding principle embedded in the design and operation of semi-

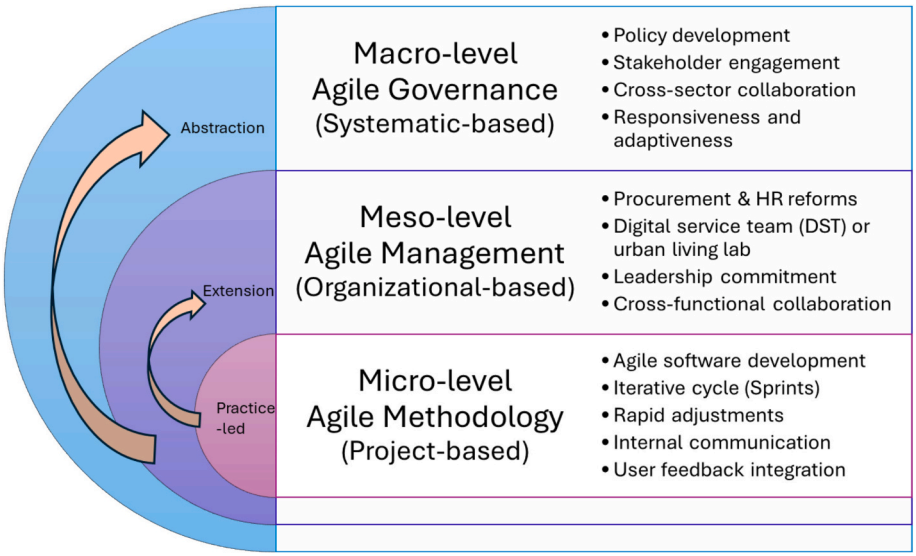

Fig. 4. Conceptualization of Agile Government.

public units. Common examples include the U.S. federal government's digital service teams (Mergel, 2019), digital government units (DGUs), and urban living labs (Gascó, 2017), all established to deliver adaptive, innovative public services grounded in agile values. Typically staffed by private-sector IT experts and supported by flexible structures, these teams demonstrate how agile management functions both as a technical strategy and as a driver of cultural transformation. This dual role is evident in structural reforms (e.g., flexible procurement, agile HR practices) and workforce development efforts (e.g., internal training, external recruitment). Fundamentally, agile management rests on two interconnected mechanisms: policy-level reforms that shape organizational structures and leadership-led efforts that foster adaptability and innovation. These examples reflect the evolving conceptualization of agility at the organizational level, positioning it not simply as a method but as a strategic orientation focused on continuous learning, responsiveness, and the creation of public value.

Finally, a growing subset of literature (e.g., Baxter et al., 2023; Neumann, Kirklies, & Hadorn, 2024) highlights agile leadership as a distinct conceptual category. Based on an empirical study by Özgenel and Asmaz (2022), agile leadership is framed as a multidimensional competency aligned with core agile values such as continuous learning, effective communication, stakeholder integration, adaptive response, and strategic innovation. Namely, agile leaders prioritize fast feedback, transparency, and collaboration over hierarchical control, fostering adaptive organizational cultures and cross-functional digital service teams capable of responding to shifting public needs (Mergel, 2016). This conceptualization positions leadership as a critical mediator between agile principles and organizational change, especially under conditions of volatility and uncertainty. This interpretation highlights a growing conceptual link between agile values and new leadership models that challenge traditional bureaucratic norms.

4.1.3. Agile governance (macro-level)

At the governance level (as shown as Fig. 4), agile is conceptualized not as a methodology, but as a governing framework, which draws on core agile values to enhance government responsiveness, adaptability, and stakeholder collaboration (Janssen & Van der Voort, 2020; Li et al., 2022). This conceptualization further abstracts agile from its managerial and technical origins and reframes it as a macro-level orientation, intended to reshape the relationship between governments and citizens by emphasizing iterative innovation, decentralization, and cross-sector engagement.

For instance, in a case study of public transportation initiatives across several European jurisdictions, agile methods are portrayed as a novel governance model for public value creation. This model is contrasted with New Public Management (NPM) and is characterized by features such as stakeholder involvement, agile-based procurement, and collaborative cross-border decision-making (Soe & Drechsler, 2018). Similarly, a case study of IT collaboration projects in China conceptualizes agile governance as a hybrid structure in which formal decision-making authority remains centralized, but accountability is distributed across government and non-government actors in a polycentric arrangement (Wang et al., 2018). Other examples include conceptualizing agile as a guiding principle for policy development (Mirzaei & Mabin, 2017; Perri 6, 2022) or as an emerging pattern within smart city ecosystems (Faber et al., 2018).

More importantly, the aforementioned literature suggests that while agile governance shares certain characteristics with adaptive governance—such as decentralization, stakeholder participation, and responsiveness to complexity, it should be conceptualized as a distinct governing approach. Adaptive governance, originally developed in the context of socio-ecological systems, emphasizes system-level resilience and long-term transformation (Wang et al., 2018). In contrast, agile governance is more narrowly focused on digitally enabled responsiveness and iterative policy adaptation, often emphasizing speed, flexibility, and short-cycle feedback mechanisms (Janssen & Van Der Voort, 2016; Li et al., 2022). While both approaches respond to complexity and uncertainty, agile governance is defined by its emphasis on operational agility and rapid experimentation, particularly in digital service delivery and cross-sector collaboration.

Despite its promise as a new paradigm in public administration (Edwin & Anuoluwapo, 2020), the conceptualization of agile governance remains somewhat abstract and loosely defined. Current studies emphasize system-level governing structures, such as normative motivations to enhance responsiveness during crises (Li et al., 2022), but offer limited detail on the specific mechanisms or institutional designs through which agile governance might be implemented, particularly regarding the interactive dynamics across micro- and *meso*-level practices. This reliance on generalized agile values (e.g., adaptability, collaboration, speed) rather than clearly defined operational practices contributes to conceptual ambiguity and creates overlap with other governance paradigms, such as collaborative governance or networked public management (Head, 2008). Moreover, tensions have emerged between agile governance and broader reform agendas. For instance, agile governance often emphasizes rapid iteration and short-term responsiveness, whereas adaptive governance, which is frequently positioned as a broader conceptual counterpart, tends to prioritize systemic and long-term transformation. These differing priorities may lead to competing objectives in practice (Janssen & Van der Voort, 2020). This lack of conceptual clarity has important implications for both implementation and evaluation, highlighting the need for future research to more clearly define agile governance's core elements, mechanisms, and practical applications.

All told, the conceptualization of agility in the public sector across three levels emerges as a dynamic, multi-level construct (Fischer & Neumann, 2024; Hong & Kim, 2020; Mergel et al., 2018), which is shown as Fig. 1. At the micro level, it is grounded in iterative project management practices that support rapid adaptation and user feedback. These practices inform meso-level shifts via an extension process, where agile is framed as a management philosophy emphasizing leadership, collaboration, and continuous learning. At the macro level, agile values are abstracted into governance models focused on adaptability, stakeholder participation, and systemic responsiveness. While the theoretical development of agile governance remains limited, the interplay across levels provides a coherent framework: agile applications at the project level catalyze organizational transformation, which in turn shapes systematic change on the governing structure. This integrated multi-dimensional framework clarifies the evolving meanings of agility, addresses concerns about conceptual ambiguity, and highlights the interdependence of micro, meso, and macro perspectives, providing a foundation for advancing theory and evaluating agile reforms in diverse public sector contexts (Fischer & Neumann, 2024; Mergel et al., 2018).

4.2. The implementation of agile government

The second question addressed in this paper investigates how agile has been utilized and implemented in the public sector. This question is essential for both researchers and practitioners, as it determines whether the conceptual benefits of agility can be realized in practice by addressing the limitations of the traditional waterfall model in public administration (Aleinikova et al., 2020; Mergel et al., 2021; Nuottila et al., 2016; Patanakul & Rufo-McCarron, 2018). In the current context of rapid digitalization and rising citizen expectations, understanding implementation is particularly important, as governments face increasing pressure to deliver more adaptive and responsive services (Mergel et al., 2018). However, while the waterfall model remains the predominant approach in the public sector, with its emphasis on hierarchical control and accountability (Middleton, 1999), the adoption of agile is expected to generate a series of implementation tensions. These tensions call for an effective mechanism for resolution, emerging from the interaction between traditional waterfall and agile models. Reviewing implementation is also critical in the context of a systematic

literature review, as it reveals the real-world factors that facilitate or hinder the translation of agile principles into tangible public sector outcomes. Following the multidimensional framework, this section begins by examining the potential implementation tensions inherent in each implementation scenario and discussing related mechanisms for addressing these tensions. Further details are outlined in Table 6.

4.2.1. Micro level: potential challenges and enabler for agile project management

The implementation of agile methodology typically aligns closely with its foundational principles, leading to conflicts with traditional waterfall-oriented practices and necessitating a range of implementation enablers. In the context of software/system development, these conflicts often arise from discord with entrenched bureaucratic structures, including hierarchical decision-making processes, rigid administrative requirements, adherence to strict timeframes, and a lack of empowerment (Berger & Beynon-Davies, 2009;Lindskog, 2022; Patanakul & Rufo-McCarron, 2018). Furthermore, the adoption of agile methodology in the public sector, celebrated for its experimental ethos and iterative refinement, faces significant challenges due to prevalent blame cultures that may stifle innovation (Berger & Beynon-Davies, 2009). Beyond conflicts with bureaucratic systems, additional managerial hurdles stem from inadequate professional support (e.g., training or reliance on outsourcing) and deficiencies in documentation and knowledge sharing practices (Berger & Beynon-Davies, 2009; Lindskog, 2022; Patanakul & Rufo-McCarron, 2018).

To mitigate these potential conflicts research highlights the importance of creating an agile-friendly environment that facilitates gradual and adaptive change, which does not abandon the traditional waterfall approach. As shown in Table 6, this begins with fostering a culture of psychological safety, encouring experimentation by allowing for failure and promoting mutual trust and empowerment within teams (Lindskog, 2022; Patanakul & Rufo-McCarron, 2018). Building on this foundation, clear and open communication, both formal and informal, is essential for aligning expectations and reducing misunderstandings, particularly in cross-functional teams (Mantovani Fontana & Marczak, 2020; Nuottila et al., 2016). Defining team roles such as Scrum Master and Product Owner further clarifies responsibilities and supports more effective coordination (Mirzaei & Mabin, 2017). To operationalize these changes, targeted training and professional development equip public employees with the necessary tools and confidence to apply agile principles in practice (Nuottila et al., 2016). Continuous feedback mechanisms, such as retrospectives, then enable teams to identify and resolve emerging issues, reinforcing a cycle of learning and adaptation (Mantovani Fontana & Marczak, 2020). Finally, incremental rollouts and pilot projects can demonstrate tangible benefits, helping to build internal support and ease the integration of agile practices within traditional project management environments (Mirzaei & Mabin, 2017).

In the scenario of agile project management, where agile methodology is adapted to oversee various projects in the public sector, a distinct dynamic emerges. In addition to the common conflicts with bureaucratic systems at the organizational level—such as cultural differences, regulatory challenges, and issues with cross-functional communication (Lindskog, 2022)—further tensions arise when introducing a software-origin methodology into project management scenarios. The adherence to the core values of agile methodology can create tensions for public sector employees, including the challenge of accommodating diverse stakeholder expectations and the need for a learning curve to adapt to new working methods and mindsets (Lindskog, 2022). Moreover, the adaption of agile methodology for project management can exacerbate tensions, as traditional project management practices may require different timeframes, unit divisions, exclusion of user stories, longer iteration periods, increased communication efforts, and considerations for political implications (Mirzaei & Mabin, 2017).

Accordingly, the scenario of agile project management requires a new set of enablers, which are expanded from the scenario of software development but pay more attention to those operative practices to address implementation challenges. A key enabler of agile implementation is flexibility, particularly through adaptive planning strategies that allow teams to respond efficiently to changes in priorities or project conditions (Zwikael, 2020). This adaptability is supported by ongoing risk analysis, which helps teams anticipate uncertainties and make timely, informed decisions without losing alignment with project objectives (Zwikael, 2020). Communication plays a vital role in this process, facilitated through formal, informal, and face-to-face interactions, along with practices like daily stand-up meetings that maintain coordination and responsiveness (Lindskog, 2022; Mirzaei & Mabin, 2017). Equally important is customer collaboration, which ensures that continuous feedback is integrated into the development process and that project outcomes remain aligned with client expectations, ultimately enhancing satisfaction (Chandrachooodan et al., 2021). Together, flexible planning, risk-informed decision-making, and active client engagement create the foundation for adaptive and effective agile project management at the micro level.

4.2.2. Meso level: agile implementation and associated organizational settings

At the organizational level, the literature (see Table 6) indicates a notable evolution of the Agile approach, with greater emphasis on core values and less focus on strict procedural requirements. This shift reduces conflicts with hierarchical, waterfall-based structures and changes the dynamics of implementation. Reported tensions are fewer and mainly concern cultural adjustments as well as administrative transitions and shifting priorities (Mergel, 2016).

The literature extensively discusses enablers (e.g., Berger, 2007; Lindskog, 2022; Mergel et al., 2018; Soe & Drechsler, 2018) for integrating Agile values into managerial practices. These enablers encompass various organizational facets and employee management strategies. Organizational settings conducive to this integration include fostering a relaxed atmosphere, aligning with organizational objectives, supporting flexible HR policies, and adaptively reallocating resources. Employee-focused strategies involve enhancing job involvement, empowerment, promoting experimentation, and nurturing competencies (Karagoz et al., 2016; Saeed et al., 2022). Moreover, leadership emerges as a critical factor in facilitating organizational integration, promoting transparency, and steering strategic planning and cultural transformation (Mergel, 2016).

At the organizational level of agile implementation, the focus is primarily on structural transformation and organizational change. To adhere to the core values of the Agile approach, it is common to witness the establishment of new public organizations dedicated to providing innovative digital services or promoting digital transformation, such as digital service teams (DST) (Mergel, 2019) or digital government units (DGU) (Clarke, 2020). However, the creation of such organizations can not only clash with traditional operational structures (Ylinen, 2021) but also raise accountability dilemmas, where “the lines of accountability linking political decision makers to government programing and spending may become blurred (Clarke, 2020: 372)”. Moreover, while this structural change typically follows a top-down reform approach, potential risks to sustainability and resistance from public employees may also be anticipated (Clarke, 2020; Ylinen, 2021). In short, at the organizational level, the focus of agile implementation has shifted from resolving conflicts with the traditional waterfall approach through specific enablers to exploring alternative paths for organizational development. One such path involves the creation of semi-public digital service teams that fundamentally operate outside the constraints of institutionalized waterfall requirements.

4.2.3. Macro level: agile governance

At the governance level, where the core values of the Agile approach are utilized to incorporate a new governing structure focusing on

Table 6
Application of agile management and associated determinants & challenges.

Level	Application scenarios	#	Identified determinants/ antecedents	Identified barriers/challenges	Examples
Project	Software/system development (Balter, 2011; Berger & Beynon, 2009; Berger, 2007; Faber et al., 2018; Fontana & Marczak, 2020; Lappi & Aaltonen, 2017; Martins et al., 2019; Mohagheghi & Aparicio, 2017; Patanakul & Rufo-McCarron, 2018; Zhu et al., 2009)	10	(1) Enablers of rapid application development (RAD): Stakeholder involvement, manager's commitment, effective communication, relatively smaller size of project, clearly defined users (2) Agile-friendly culture: Enabling the tolerance of failure; organizational trust; empowered and decentralized decision-making process; transparent and unequivocal culture, ability to adapt changes. (3) Managerial settings: Addressing the tension between traditional PM and agile methods, conducting pre-analysis (4) Team building/coordination: Team collaboration, team communication, learning and creating knowledge	(1) Conflicts with the traditional bureaucratic environment: Bureaucratic/hierarchical structure, centralized decision-making process; a blame culture, consolidation of requirement, challenge of strict time frame, the tension between the empowerment of the project team with the traditional communication and coordination procedures, integration with standard processes, tools, and techniques, resistance to change, fixed, detailed, and control-oriented project plan; (2) Managerial failure: Lack of the accessibility to expert and training, Lack of stakeholder involvement, Product owner commitment; poor documentation or knowledge sharing; difficulty of outsourcing	(1) An agile development approach, known as Rapid Application Development (RAD), was implemented in a large-scale technical system design project within the public sector of the UK. (2) An agile methodology was proposed to develop a Visual Analytic System (VAS) aimed at enhancing innovative mobility infrastructures as part of a smart-city project.
	Project management (Chandrachooodan et al., 2021; Lindskog, 2022; Marović & Bulatović, 2020; Mirzaei & Mabin, 2017; Yoshida & Thammetar, 2021; Zwikael, 2020)	5	(1) Managerial settings: Focusing on individual interaction, Flexible management structure of human resources, Mutual adjustments of the team, a clear definition of the scope (i.e., time frame) of Scrum, process validity, and never neglecting the regular activities (2) Communication & coordination: Formal and informal communication, Face-to-face communication, Daily stand-up meeting (3) Organizational environment: Culture of constant change, Instant response to environmental change (4) Flexibility: Flexible planning strategies to enhance the adaptability (5) The analysis of risk level (6) Customer/client: Customer collaboration or engagement, enhancing customer satisfaction.	(1) Organizational transformation: Culture, strategy, and structure; project evaluation; cross-functional communication; regulation (2) Tensions associated with agile values: Belonging tension, organizing tension, performing tension, learning tension (3) Transition associated applying traditional agile methodology: time frame setting, communication, no user stories, division of unit, long-duration iterations, and political context. (4) Challenges revealed in e-governance project: Resistance to change, lack of project standardization, and vendor driven implementation.	(1) Agile methodology techniques, specifically Scrum, were adapted and utilized for a policy development project within a government agency in New Zealand. (2) A hybrid agile organizational model was introduced to address the limitations of traditional project management in local self-government units in Croatia.
	Covid-19 response (Kovač & Klun, 2021; Moon, 2020; Nazir et al., 2022; Wakeling et al., 2022)	4	(1) Extension of agile practices in a hyper-agile context: a) Prevent pursuing continuous integrations but make clear divide; b) extremely short iterations; c) only conduct minimal testing; d) ambidextrous team; e) using open-source tools	(1) The changing environment of public service delivery under the context of COVID-19 (i.e., closures or staffing issues) (2) The different demands of crisis management	(1) A mission-critical system was developed to showcase the necessary extensions of agile practices for a hyper-agile context.
	Open innovation (McBride et al., 2019; Tate et al., 2018; Velsberg et al., 2020)	3	(1) Changing environment: a) The situation of the fuzzy front end (FEE), in which the needs or resources for a specific public service remains unknown; b) The necessity of simultaneously working on multiple projects/ of OGD (2) Facilitators of agile methodology: a) design-led innovation, b) open and multi-disciplinary opt-in team culture, c) a flexible and neutral space	(1) Lack of cross-agency vision or cross-department integration (2) Internal cultural barriers and low tolerance of failure (3) The practice of innovation by outsourcing (4) Digitalization of services without real transformation	(1) Agile methodology was regarded as a primary solution to overcome obstacles related to open innovation in the public sector, with a specific focus on the context of FEE.
Organizational	Organizational management (Karagoz et al., 2016; Mergel, 2016; Saeed et al., 2022; Torneo & Mojica, 2020)	4	(1) Organizational settings: a) the establishment of a casual environment, b) a set of workspaces allowing speedy access to the project team, c) a sense of purpose beyond the project team; d) policies supportive innovative HR management & acquisition, e) an agile-oriented process management	(1) Cultural change (2) Administration transition	(1) A case study of the Victorian Public Sector in Australia showcases an innovative implementation of agile management, wherein the conventional agile methodology is transformed into a managerial approach for knowledge management within ICT project

(*continued on next page*)

Table 6 (*continued*)

Level	Application scenarios	#	Identified determinants/ antecedents	Identified barriers/challenges	Examples
			approach, flexibly organize resources. (2) Leadership: facilitating organization's integration, transparency, strategic planning, and culture building. (3) Employee: a) individual's job involvement and empowerment, b) encouragement of experimentation, collaboration, and retaining competency		environments through ongoing informal and face-to-face interactions (Karagoz et al., 2016).
	Organizational development (Clarke, 2020; Mergel, 2019; Seri et al., 2014; Ylinen, 2021)	4	(1) The limitations of traditional bureaucratic system; response to the growing demand for digital services (2) Internal: Agile acquisition; Agile innovation management (startup culture and human-centered design), b) Response to the effects of the digital transformation inside the IT department	(1) The structure and limitations of the traditional operational structures (2) Employees' resistance to change (3) The accountability dilemma (4) The risk of top-down reform efforts	(1) Agile has been adopted as the primary principle and practice guiding the operations of digital service teams (DSTs) or digital government units (DGUs) (Clarke, 2020; Mergel, 2019). (2) The agile approach serves as the primary solution facilitating the process of digital transformation within the IT department and throughout local government.
	Leadership (Özgenel et al., 2022; Trevor & Kilduff, 2012)	2	(1) Working environment: Volatility, Uncertainty, Complexity and Ambiguity (VUCA); Complex and dynamic operating environment, networked and empowered communities, (2) Managerial purpose: increasing employee satisfaction,	NA	(1) The practices of agile have evolved into a specific leadership style known as agile leadership, characterized by effective communication skills, stakeholder cooperation, rapid and adaptive response to changing environments, flexible management, and innovative strategy development.
Governance	Agile governance (Herranz, 2009; Janssen & Van der Voort, 2020; Li et al., 2022; Soe & Drechsler, 2018; Wang et al., 2018)	5	(1) Motivations: a) Facilitating the crisis management via the greater flexibility, b) Addressing the limitations of traditional waterfall bureaucratic method (#76) or New Public Management (NPM), which usually pursues a one-size-fit-all solution, c) the generation of experimental solutions to long standing challenges, d) responding to the increasing demands of responsive and adaptive public services from citizens traditionally delivered via an outsourcing manner.	(1) The potential conflict with the adaptive governance, in which it might be less likely to simultaneously pursue rapid response and system-level changes.	(1) Based on the practices of social media communication in China during the pandemic, the concept of agile has transitioned from a software design method to a governance structure and system-level discretion. This emphasizes not only providing responsive services but also highlighting intensive collaboration and communication via ICTs (Li et al., 2022). (2) Drawing from a case study of public transportation in European areas, Agile methods are considered a new governance approach for public value, compared with NPM. This approach features adaptivity, decentralization, agile-based procurement, stakeholder involvement, and collaboration among cross-border regions (Soe & Drechsler, 2018). (3) In IT collaboration projects in China, Agile governance is portrayed as a structure with a polarized distribution of decision-making power held by the government, coupled with a polycentric distribution of accountability across government and non-government stakeholders (Wang et al., 2018).

government responsiveness and collaboration with stakeholders, current literature (e.g., Herranz Jr, 2009; Janssen & Van der Voort, 2020; Li et al., 2022) once again reveals a distinct dynamic of implementation. Firstly, only one type of tension has been identified—the potential conflict arising from the pursuit of adaptive governance. In this scenario, the rapid response inherent in agile governance may clash with the objective of adaptive governance to instigate system-level reforms (Janssen & Van der Voort, 2020). This conflict is particularly pronounced when public authorities must choose between delivering short-term, highly responsive actions and investing in longer-term systemic transformation, which often requires slower consensus-building processes and structural redesign (Herranz Jr, 2009; Janssen & Van der Voort, 2020).

Secondly, since the choice between agile governance and other

governing structures is not strictly dichotomous, recorded enablers primarily consist of motivational factors advocating for why an agile governance structure should be favored in the contemporary context, such as for crisis management purposes (Li et al., 2022), rather than detailing how to effectively implement such a governance structure. Agile governance has been framed as a response to the rigidities of traditional bureaucratic or New Public Management approaches, offering experimental, decentralized, and adaptive mechanisms suited to today's complex governance challenges (Soe & Drechsler, 2018; Wang et al., 2018). Certain preference toward agile governance may also be attributed to the simplification and abstraction of agile methodology implementation, focusing solely on its core values, which are also evident in other governance structures, such as stakeholder collaboration in the paradigm of collaborative policy networks (Head, 2008). However, while agile governance is expected to promote responsiveness and innovation, its abstraction often limits practical guidance for implementation. As a result, without widespread and formalized methodology adoption, discussions around operational challenges or structural antecedents remain limited.

In sum, the implementation of agile principles across project, organizational, and governance levels reveals a layered and evolving landscape (see also Fig. 4). At the micro level, adoption is marked by procedural tensions with traditional bureaucracies and waterfall approach, but enabled by flexible planning, risk assessment, and active client engagement. At the *meso* level, tensions diminish as agile values are integrated into broader organizational reforms, supported by leadership, adaptive HR practices, and organizational development. At the macro level, agile governance offers a promising framework for responsiveness and collaboration, yet remains largely abstract and underdefined in terms of concrete implementation. Comparatively, as implementation moves from operational to strategic domains, tensions become more conceptual than procedural, while enablers shift from concrete managerial tools to broader motivational justifications. This stratified pattern suggests that the diffusion of agile in the public sector is not uniform but context-dependent, with each level requiring distinct capacities and support structures.

4.3. The effectiveness/impacts of agile approach

The final research question of this systematic literature review seeks to examine the effectiveness of agile in the public sector. The significance of this question lies in determining whether widely promoted agile principles can translate into meaningful outcomes, which could further ensure that agile adoption is both evidence-based and contextually appropriate. Following the same multidimensional framework, this section examines eligible articles that provide empirical evidence to assess the potential impacts of the agile approach in the public sector.

The related findings are presented in Table 6. Given the apparent variability in the potential impacts of agile approach across different implementation levels, this study categorizes empirical studies into two groups: project-level agile methodology and organizational-level agile management. Notably, empirical studies at the governance level were not found. Furthermore, Table 6 also includes pertinent information from each empirical study regarding the implementation scenario, research approach, and highlighted impacts of agile.

At first glance, the identification of only 8 empirical studies (as shown as Table 7) might suggest that the topic of evaluation has been under-researched, especially considering that the concept of agile

Table 7
The effectiveness of agile management.

Level	Implementation scenarios	Research approach	Effects (+/−)	Sources
Project	Open Government Data	Qualitative	1. Rapid development (+) 2. Validated learning (+) 3. Incremental development (+) 4. Constant testing (+) 5. Quick response to feedback and evaluation (+)	(McBride et al., 2019)
	Joint services of public transportation across multiple European cities	Qualitative	1. Quality of services (+) 2. Trust in organization (+) 3. Achievement of social outcome (+)	(Soe & Drechsler, 2018)
	Agile software development (ASD)	Qualitative	1. Team collaboration & customer collaboration (+) 2. Learning and creating knowledge (+) 3. Managing changing priorities (+) 4. Stakeholder satisfaction (+) 5. Enhance software quality & productivity (+) 6. Business/IT alignment (+) 7. Project visibility (+)	(Mantovani Fontana & Marczak, 2020)
	Knowledge management using Agile techniques	Qualitative	1. Promote knowledge sharing (+) 2. Demonstrate equality &freedom of expression (+) 3. Immediate access to the project team (+)	(Karagoz et al., 2016)
Organizational	Agile leadership	Quantitative	1. Enhance internal & external job satisfaction (+) 2. Increase organizational justice (+)	(Özgenel & Asmaz, 2022)
	Implementation of agile approach in public IT department	Qualitative	1. Improve understanding of the operational situation (+) 2. Improve visibility of actions (+) 3. Enhance the flexibility of money allocation (+) 4. Facilitate collaboration (+) 5. Improve customer service & satisfaction (+) 6. Employee's negative attitude toward constant change (−) 7. Generate financial challenges (−) 8. Unsustainable dependence on consultants (−)	(Ylinen, 2021)
	Workforce agility in higher educational institutions	Quantitative	1. Enhance workforce performance (+)	(Saeed et al., 2022)

methodology was introduced in the early 2000s (Cockburn & Highsmith, 2001), and its hypothetical impacts have been widely discussed in prior research (e.g., Boer & Van Engers, 2013; Janssen & Van der Voort, 2020; Mergel et al., 2018). However, these studies reflect an evolving application of agile techniques, with earlier work focused on software development and later studies expanding to managerial and organizational contexts.

4.3.1. The project-based empirical studies

Firstly, at the project level, prior literature has examined the impacts of agile methodology on various projects, including a development project of open government data (OGD) in Chicago (McBride et al., 2019), a joint service improvement project of public transportation in two European capital areas (Soe & Drechsler, 2018), agile software development projects in Brazil (Mantovani Fontana & Marczak, 2020), and the practices of project management and knowledge management mediated with agile methodology in the Victorian Public Sector in Australia (Karagoz et al., 2016). These project-based evaluation studies generally focus on the implementation and application of agile practices within local or regional government projects.

Across these empirical studies, the impacts of agile are generally positive, with benefits tied to core agile practices: stakeholder collaboration, incremental development, responsiveness to uncertainty, and flexible procurement (Berger & Beynon-Davies, 2009; Lappi & Aaltonen, 2017; Nuottila et al., 2016). These studies underscore how agile contributes to improved productivity, quality, knowledge sharing, and stakeholder satisfaction.

In Chicago's open government data project, McBride et al. (2019) found that agile methodology enabled the inclusion of previously marginalized stakeholders, accelerated development, and fostered iterative learning. Similarly, in Brazil, Mantovani Fontana and Marczak (2020) emphasized agile's role in boosting internal team communication and knowledge sharing while enhancing responsiveness and stakeholder satisfaction.

Soe and Drechsler (2018) highlighted external impacts such as improved trust in government, while Karagoz et al. (2016) noted internal impacts like stronger team cohesion and freedom of expression in agile-mediated knowledge management. Taken together, these studies demonstrate that even in varied policy contexts, agile techniques can enhance both internal organizational dynamics and external stakeholder relationships.

4.3.2. The organizational-based empirical studies

Organizational-level evaluation studies, predominantly published after 2020, reflect the evolution of agile practices from an operational technique used in technology development projects to a strategic approach for managing public organizations (Mergel et al., 2021). These studies, as listed in Table 7, examine how agile management impacts organizational culture, performance, and leadership practices in diverse settings, including education and municipal IT departments. Examples include agile leadership in Istanbul's public schools (Özgenel & Asmaz, 2022), municipal IT departments in Finland (Ylinen, 2021), and workforce agility in higher education institutions in Pakistan (Saeed et al., 2022). This shift signals a broader organizational interest in agile applications beyond software or IT contexts. Compared to project-based studies, organizational-level research emphasizes different applications of agile and its potential impacts within broader public administration contexts. In these cases, agile is reinterpreted less as a technical process and more as a set of leadership principles and management values that enhance organizational responsiveness. This transformation allows public organizations to incrementally adapt to complexity and uncertainty, moving away from rigid, linear project designs (Ribeiro & Domingues, 2018).

For instance, Ylinen (2021) studied agile management in a Finnish municipality's IT department and found that empowerment, a core principle of agile, can enhance employees' understanding of operations, encourage resource flexibility, and improve customer service. However, it also surfaced negative effects, including change fatigue, dependency on external consultants, and rising financial costs. These mixed findings underscore the need for balanced implementation strategies. Saeed et al. (2022) investigated workforce agility in Pakistan's higher education sector, revealing that job involvement and spiritual values mediate the relationship between employee agility and organizational performance. This study is among the few to offer a quantitative model for linking agility-related traits to performance outcomes. Özgenel and Asmaz (2022) focused on agile leadership in public schools, defining it through dimensions like situational awareness and self-awareness. Their results showed a positive relationship between agile leadership and job satisfaction, mediated by perceptions of organizational justice. This finding suggests that agile practices may indirectly shape workplace culture, improving how employees view fairness and transparency.

4.3.3. Limitation and gaps in existing empirical studies

While the findings across these eight studies are encouraging, it is important to note some areas of concern in the collected literature, as listed in Table 7. Firstly, the research findings of these studies are disproportionately derived from one research approach—qualitative methodology. While the selection of the research method is largely determined by the associated research question or purpose, disproportionately focusing on one specific research approach may raise concerns about external validity. This concern could be more apparent when the targeted scenarios span multiple countries with different backgrounds, and the targeted practices of agile methodology cover a variety of projects or managerial settings with distinctive contexts. Additionally, solely relying on interviewees' self-reported observations to evaluate the potential impacts of agile may encounter limitations, as individual cognitive responses or perceptions could be inaccurate or biased.

Secondly, the highlighted impacts tend to be positive, which might only present a partial story. As previously mentioned, the essence of agile management is to pursue flexibility and rapidity, which is fundamentally different from the ordinary bureaucratic system that emphasizes organizational stability and accountability. This fundamental difference and the implementation barriers or challenge it causes have been widely discussed in the literature. However, the potential discussion regarding the negative impacts caused by the conflicts arising from this fundamental difference or implementation has been largely neglected. Finally, the present review also emphasizes a significant observation that previous empirical studies tend to primarily focus on elucidating the potential causal relationship between agile management and various variables. However, these studies may pay less attention to the development of a foundational theoretical framework that delineates the intricate dynamics among multiple factors. Without a robust

theoretical framework, researchers may overlook the potential impacts of other factors, fail to provide a comprehensive understanding of other potential mediations or moderations influencing the causal relationships, or hinder the replication of future studies.

The findings of this section further suggest that the conceptualization of agile in the public sector follows a bottom-up trajectory, evolving from practical applications rather than theoretical models. This pattern is similar to its development in the private sector,[3] where agile adoption has also been largely practitioner-driven. At the micro level, agile is understood as a project management tool marked by sprint cycles and iterative development (Mergel, 2016; Ylinen, 2021). At the *meso* level, these techniques are transformed into broader managerial values such as responsiveness and iteration, embedded into organizational practices (Clarke, 2020; Özgenel & Asmaz, 2022; Saeed et al., 2022). At the macro level, agile is further abstracted into a governance model centered on flexibility, stakeholder engagement, and iterative policymaking (Janssen & Van der Voort, 2020; Li et al., 2022). This bottom-up conceptualization and implementation pattern, in contrast to traditional top-down administrative reforms, highlights how agile practices developed at the micro level gradually inform higher-level organizational and governance structures (Roberts, 2020).

5. Discussion and conclusion

While agile has been widespread in the public sector, there is a notable absence of comprehensive studies systematically outlining its applications across different contexts and comparing them based on varying levels of conceptualization. Without such studies, enhancing current agile practices or synthesizing prior research findings from diverse scenarios becomes challenging, especially considering that agile has been simultaneously interpreted as a project management technique (Wernham, 2012), managerial approach (Soe & Drechsler, 2018), or a governing structure (Janssen & Van der Voort, 2020). With this objective in mind, this research aims to address three questions respectively covering conceptualization, implementation, and empirical impacts. Furthermore, this section aims not only to synthesize related findings through a multidimensional framework but also to deepen the theoretical discussion on whether and how agile can be meaningfully implemented at different levels, offering insights that may inform both past interpretations and future research directions.

5.1. A multidimensional theoretical reflection

Given that much of the existing literature lacks a solid theoretical foundation (Neumann, Kirklies, & Schott, 2024), this review-based study does not attempt to construct a unified theory of agile government. Instead, it acknowledges the complexity and variation of agile practices and research and proposes a multidimensional approach as a guiding theoretical framework (Fischer & Neumann, 2024; Hong & Kim, 2020; Mergel et al., 2018). This framework helps clarify the conceptualization, implementation, and impacts of agile government at the micro, *meso*, and macro levels while accounting for associated contextual factors. Such a discussion is critical because it moves beyond surface-level adoption issues to examine the underlying conditions, constraints, and adaptations required for successful agile implementation in the public sector. Furthermore, a multidimensional theoretical framework not only deepens understanding of how agile can be implemented more effectively but also highlights the interactive dynamics that unfold across the three levels.

5.1.1. Micro/project level: the challenge of mismatch and the call for transformation

At the micro level, agile is predominantly conceptualized as a project management methodology defined by sprint cycles and iterative development, aimed at ensuring continuous output delivery in large-scale software development or project-based work (Mergel, 2016; Ylinen, 2021). However, a consistent theme in the literature highlights a fundamental mismatch between agile methods and the bureaucratic, waterfall-oriented, and rigid accountability structures that dominate public sector project management (Berger, 2007;Berger & Beynon-Davies, 2009; Lappi & Aaltonen, 2017). Scholars point out that implementation emphasis on flexibility, decentralization, and continuous adaptation often conflicts with hierarchical decision-making, inflexible administrative procedures, and a culture of risk aversion (Berger, 2007; Berger & Beynon-Davies, 2009). As aforementioned, this misalignment creates practical barriers, including delayed decision cycles, limited team autonomy, and difficulties in integrating agile practices within traditional project management frameworks.

These challenges have prompted researchers to ask whether adopting agile at the micro level requires isolated pilot programs, expanded managerial discretion, or even a redefinition of authority structures. Many scholars emphasize that successful agile adoption entails more than technical modifications; it also depends on supportive managerial and organizational conditions (e.g., Mergel, 2016). Specifically, project-level implementation often necessitates broader internal transformations within the public sector, including shifts away from rigid control systems toward greater autonomy, trust, and iterative learning (Berger & Beynon-Davies, 2009; Lappi & Aaltonen, 2017). The theoretical implication is clear: agile cannot simply be embedded into existing bureaucratic frameworks. Instead, it requires a fundamental rethinking of how public projects are conceived, managed, and delivered. In short, at the micro level, agility is not merely a supplementary tool but is often conceptualized as a catalyst for structural transformation.

5.1.2. Meso/organizational level: organizational development, hybrid models, and the role of new structures

At the organizational (*meso*) level, the discussion shifts from a focus on project-level transformation to broader questions of organizational development and adaptations. While conflicts with bureaucracy persist, the collected literature (e.g., Karagoz et al., 2016) increasingly emphasizes the potential of agile to facilitate knowledge management, foster collaboration, and drive innovation within public organizations. These outcomes are believed to be derived from a series of agile-centered organizational conditions, including empowerment, experimentation, leadership commitment, and responsiveness (Karagoz et al., 2016). Although some tensions with bureaucratic norms remain, researchers increasingly approach agility at this level as a matter of organizational logic rather than replacing the conventional settings of the public sector outright.

Accordingly, to address the challenges at the organizational level, scholars increasingly recommend creating experimental and semi-public

[3] The conceptualization of agile in the public sector shares important similarities with its private sector counterpart, yet diverges in key respects. Both sectors trace agile's origins to software development methodologies, which have since evolved into broader managerial techniques for organizational management (Anifa, 2024; Dong et al., 2024; Mergel et al., 2018). In both contexts, agile adoption has been largely driven by practitioners, often preceding the establishment of a formal theoretical foundation (Neumann, Kirklies, and Schott, 2024; Baxter et al., 2023). This has resulted in a pragmatic, "learning by doing" approach that emphasizes iterative development, cross-functional teamwork, and rapid feedback cycles as tools to enhance adaptability and value creation (Balog, 2020; Baxter et al., 2023).

In practice, both sectors adopt agile methods at the micro level when contextual pressures make iterative planning more beneficial than rigid, linear approaches. These decisions are often shaped by operational needs rather than by overarching value systems or institutional mandates (Baxter et al., 2023; Meckenstock, 2024; Neumann, Kirklies, and Schott, 2024; Serrador & Pinto, 2015; Stray et al., 2022). This bottom-up trajectory has contributed to fragmented knowledge, inconsistent practices, and a limited ability to establish generalizable best practices or effective implementation strategies.

entities—such as Urban Agile Living Labs, Design-led Teams, Digital Service Teams (DSTs), Digital Government Units (DGUs), and Open Innovation Units (OIUs)—that operate with greater flexibility and maintain closer ties to the private sector (Soe & Drechsler, 2018; Tate et al., 2018; Ferreira Martins et al., 2019; Mergel, 2019; Clarke, 2020; Lindquist & Buttazzoni, 2021). These entities function as intermediaries between government and innovation ecosystems, enabling agile experimentation outside rigid legacy structures. This meso-level approach emphasizes organizational development and advocates for hybrid models that layer agile practices atop existing bureaucratic departments or apply them selectively based on contextual fit (Lindskog, 2022; Marović & Bulatović, 2020). Practically, the emphasis of organizational development may be based on the acknowledgement that public organization cannot be fully transformed into an agile-friendly environment. Theoretically, this also reflects a contingency perspective (Zwikael, 2020), where the optimal approach to agile adoption depends on organizational context, objectives, and specific implementation challenges. Recognizing the limitations of fully abandoning traditional bureaucratic or waterfall models, proposals for hybridization and new organizational forms offer pragmatic solutions that allow public organizations to balance stability with adaptability.

5.1.3. Macro/governance level: agile as a new paradigm and the logic of institutional layering

At the macro (governance) level, the implementation of agile is conceptualized not merely as a set of technical practices or organizational adjustments but as a potential new paradigm for public administration (Edwin & Anuoluwapo, 2020). In this view, agile is framed as a governing approach that prioritizes responsiveness, stakeholder collaboration, and iterative policy development (Janssen & Van der Voort, 2020; Li et al., 2022). Empirical studies have shown its application in areas such as policy innovation (Mirzaei & Mabin, 2017; Perri 6, 2022) and smart city ecosystems (Faber et al., 2018). Still, the literature consistently emphasizes that such transformations tend to be gradual and layered, rather than abrupt or wholesale (Edwin & Anuoluwapo, 2020). The prevailing argument is that conventional governing structures should not, and realistically cannot, be fully replaced by agile governance.

The related literature at the macro level indicates that agile governance should operate as an additional layer within existing institutional arrangements, coexisting with and complementing traditional or adaptive governance models (Janssen & Van der Voort, 2020; Kovač & Klun, 2021; Ylinen, 2021). This process of institutional layering facilitates incremental change by allowing governments to pilot agile approaches in specific contexts, such as crisis response, without destabilizing core bureaucratic systems (Li et al., 2022). The coexistence of agility and adaptability is considered essential: agility enables rapid experimentation and responsiveness, while adaptive governance supports long-term learning and systemic resilience.

In summary, applying the multidimensional theoretical framework to categorize the literature into micro, *meso*, and macro levels has yielded several important insights. This analysis shows that the feasibility and implications of agile government are highly context-dependent and can only be fully understood by examining the interactions across these levels. At the micro level, persistent concerns arise regarding the compatibility of agile methods with bureaucratic rules and rigid procedures. At the *meso* level, as illustrated in Fig. 4, evidence highlights the selective institutionalization of agile principles through organizational culture shifts and new managerial arrangements. At the macro level, by contrast, abstracted agile principles and broader institutional logics define the scope and legitimacy of agile reforms. Together, these findings caution against reducing agile government to a one-size-fits-all model and instead emphasize that theory-informed strategies must account for how context, capacity, accountability, and political environments intersect across levels to shape outcomes.[4]

5.2. Future research agenda

As mentioned earlier, despite the diffusion of agile project management practices into the public sector since the early 2000s, the literature remains limited, with only 55 articles included in this paper's final analysis. Given this limitation, it is anticipated that there are research gaps which could inform future research agendas. The following topics are suggested for future research.

1. *Advancing Quantitative Research on Agile Government.* A balanced integration of quantitative and qualitative research methods is essential to ensure analytical rigor, enhance external validity, and generate actionable insights for practitioners. While qualitative approaches help uncover process-level dynamics and contextual nuances, quantitative designs are necessary to test causal relationships and assess generalizability across cases. However, among the 55

[4] Following the prior comparison between two sectors, the public sector's approach to agile differs in several important ways. First, while the private sector's agile evolution has focused primarily on project and organizational levels, it lacks a direct equivalent to the governance-level (macro) conceptualization observed in the public sector. Some scholars have begun exploring cross-industry and cross-organizational applications of agile, but these efforts remain limited in scope (Conforto et al., 2014; Mergel et al., 2018; Neumann, Kirklies, and Schott, 2024). Second, adopting agile in the private sector is typically a strategic decision based on weighing its benefits against the reliability of traditional waterfall approaches. In contrast, public sector organizations operate under legal and institutional constraints that prevent them from abandoning rigid accountability structures.

As a result, public organizations often adopt hybrid models that allow agile practices to function within existing bureaucratic frameworks. These models may involve the creation of specialized units, such as digital service teams or innovation labs, or the addition of new governance mechanisms to support flexibility without dismantling core structures (Clarke, 2020; Lindquist & Buttazzoni, 2021; Mergel, 2016). This need for hybridization and institutional layering reflects the public sector's challenge of balancing agility with legal compliance, political oversight, and service equity (Neumann, Kirklies, and Schott, 2024; Mergel et al., 2018). In sum, while both sectors are rooted in shared agile principles, the public sector's multidimensional, context-sensitive conceptualization across micro, *meso*, and macro levels underscores the importance of tailored strategies that address its unique constraints and responsibilities (Dong et al., 2024; Neumann, Kirklies, and Schott, 2024).

reviewed studies, only 7 (12.7 %) employed quantitative methods, indicating a significant gap in the collected literature. In contrast, private sector research has demonstrated the effectiveness of survey-based and statistical approaches in identifying the determinants and outcomes of agility (e.g., Serrador & Pinto, 2015). Public sector research should similarly incorporate quantitative methods to examine the fundamental assumption of the agile approach, which posits that iterative adaptation, collaboration, and flexibility can generate better outcomes in complex and uncertain environments. Future studies may ask under what conditions agile practices enhance efficiency in public programs, how agile implementation affects stakeholder engagement and satisfaction, and to what extent the iterative nature of agile improves project performance compared to traditional methods. Greater use of quantitative and mixed-method approaches would not only complement existing case-based evidence but also strengthen the foundation for theory-building in agile public management (Denning, 2016).

2. *Theoretical development of agile government.* As noted earlier, one major limitation in the current agile government literature is the absence of a robust theoretical foundation, which could further restrict cumulative knowledge-building and limits generalizability (Baxter et al., 2023; Neumann, Kirklies, & Schott, 2024). Many studies remain descriptive and case-bound, often failing to explain how or why agile initiatives succeed or fail or to provide detailed accounts of the mechanisms involved. One key insight from this review is that agile implementation and outcomes are usually embedded in the level of context (micro, *meso*, or macro) which underscores the value of the multidimensional theoretical framework as a foundation for systematic theorizing.

   Building on this framework, future research should move beyond static descriptions and pursue comparative, theory-driven inquiries across multiple levels of analysis. At the micro level, scholars could examine which bureaucratic rules, rigid procedures, and forms of street-level discretion influence the effectiveness of agile methodology, particularly how civil servants balance waterfall-based standardization with adaptive, iterative practices. At the meso level, research could investigate organizational conditions that foster the institutionalization and sustainability of agile management, including managerial autonomy, leadership support, institutional design, and the presence of innovation units. At the macro level, important questions include which institutional logics and governance regimes shape the legitimacy of agile governance and how its influence can be measured within public management systems. Integrating these levels enables future studies to reveal the multilevel dynamics and contextual contingencies that determine the adoption and outcomes of agile approaches in the public sector.

   This multidimensional approach parallels private sector scholarship that has examined how agile's effects vary across industries depending on factors such as team size, organizational structure, and customer involvement (Conforto et al., 2014). Adopting similar systematic strategies in the public sector would help move the field beyond isolated case studies toward a more comprehensive and generalizable understanding of agile practices in diverse public sector environments (Baxter et al., 2023; Conforto et al., 2014; Neumann, Kirklies, & Schott, 2024).

3. *Dynamics across three levels of implementation.* This systematic review reveals that the development of agile government has been predominantly practice-driven at the micro (project) level (see footnote for details). This pattern mirrors the practitioner-led evolution observed in the private sector but contrasts with the top-down, policy-oriented reforms associated with New Public Management (NPM) (Hood, 1995; Roberts, 2020). Recognizing the dynamics across micro, meso, and macro levels has become an important issue in the academic community, particularly since "there is uncertainty about the relationship between levels and concern about a 'schism' in research (Roberts, 2020: 631)".

   The multidimensional framework proposed in this study helps address these concerns by highlighting how bottom-up diffusion from the micro level can also shape broader organizational and governance practices. Future research should further examine two issues in particular. First, there is a need for empirical studies that systematically examine how and why agile practices are abstracted from project-level applications and become embedded in broader organizational routines or governance frameworks. Research could explore the mechanisms that enable or constrain this upward diffusion of agile principles, such as organizational learning, leadership advocacy, and inter-organizational networks. Second, empirical evidence will be needed to assess whether the abstraction of agile principles to meso and macro levels effectively mitigates tensions with traditional waterfall procedures and hierarchical structures, or whether new forms of conflict or hybridization appear (Zwikael, 2020; Mergel, 2019; Clarke, 2020). Advancing theoretical and empirical understanding of how agile operates across micro, meso, and macro levels could strengthen the multidimensional framework proposed in this review and help public organizations better account for contextual variables, contingencies, and cross-level dynamics.

5.3. Research limitations

While this systematic literature review generally adheres to the PRISMA guidelines, it is important to acknowledge potential limitations in the scope of collected literature, which could affect the research findings. Firstly, this study is limited to English-language papers due to the authors' language proficiency. Additionally, it focuses solely on peer-reviewed journal articles, excluding other potential sources such as books (e.g., Hastings, 2024; Wernham, 2012) and technical papers (e.g., those published by the IBM Center for the Business of Government). While these sources hold significance, their exclusion aligns with PRISMA's requirement for a transparent and replicable data collection process, particularly given the absence of a unified portal for accessing them. Finally, it is crucial to note that the systematic literature review offers the authors' interpretations of recorded information. For further inference or validation of these interpretations, independent empirical examinations would be necessary.

Data statement

This manuscript is based on a systematic literature review. As such, no original datasets were generated or analyzed during the course of this research.

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Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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