



Digital innovation strategies in the public sector

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ABSTRACT

Despite the increasing attention on digital innovations in the private sector, little is known about digital innovation strategies in the public sector. This knowledge gap is growing as public sector employees are increasingly embracing new digital tools and ideas. Drawing on rich qualitative data from practitioners in 25 cities across 18 countries, this study analyzes the digital innovation strategies pursued in the public sector, with specific attention placed on digital orientation and the foci of value creation activities. Extending the OECD's Observatory of Public Sector Innovation (OPSI) framework, we identify four distinct digital innovation strategies in the public sector: enhancement-oriented, anticipatory, adaptive, and persistent. Our findings reveal that enhancement-oriented and persistent strategies are the most prevalent, reflecting a strong focus on internal value creation through process optimization and long-term organizational change. In contrast, adaptive and anticipatory strategies are less common. We find a near-equal prevalence of incremental and transformational goals, indicating balanced strategic orientation. Our findings also suggest that practitioners often employ multiple strategies, reflecting the multifacetedness of driving digital innovation in the public sector. We provide valuable insights into various activities linked to the four identified innovation strategies, ending with a comprehensive discussion of our findings, conclusions, study limitations, and future research directions.

1. Introduction

Innovation has long been considered a key driver of improving processes, products, and services across sectors (Demircioglu and Audretsch, 2024; Gault, 2018; OECD, 2017). Traditionally, innovation in both the public and private sectors has focused on incremental enhancements to existing systems or the introduction of entirely new methods and structures to meet evolving needs (Martin, 2012). However, the advent of digital technologies has profoundly transformed the innovation landscape, giving rise to what is now termed *digital innovation* (Fichman et al., 2014). Unlike traditional innovation, digital innovation has the ability to foster real-time interactions and to create adaptive, interconnected ecosystems; it therefore fundamentally changes business models, organizational structures, and value creation mechanisms (Yoo et al., 2012). Digital innovation has attracted considerable attention among both scholars and practitioners (e.g., Scott et al., 2017; OECD, 2019; Boudreau et al., 2022; Yoo et al., 2012; Nambisan et al., 2017).

Similarly, public sector organizations (PSOs) are increasingly exploring how digital innovation opportunities can help address

operational and societal challenges, and a growing body of research is exploring digital innovation in the public sector. Scholars have analyzed the factors that influence the adoption of digital technologies (Cepparulo and Zanfei, 2021) and how they can improve service delivery and create public value (Panagiotopoulos et al., 2019). Despite this background, there is still a limited understanding of digital innovation strategies in the public sector—namely structured, goal-driven approaches designed to help PSOs realize public value through digital innovation (Denicolai and Previtali, 2023). We need a clear conceptualization of digital innovation strategies, because they hold opportunities to cut across traditional boundaries, to embrace networks and ecosystems, and to accelerate development and evolution of IT infrastructures, products, services, and operational processes (Nambisan et al., 2019). We must understand digital innovation strategies if we are to plan, implement, and evaluate transformational and incremental change to create public value via digital innovation.

This gap persists for two main reasons: First, our understanding of digital innovation in the public sector has predominantly centered around the broader factors that foster digital innovation (Cepparulo and Zanfei, 2021; Vickers et al., 2017) as well as how new digital

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technologies are framed (Guenduez and Mettler, 2023) and implemented (Hong et al., 2022) in PSOs. Further, policy-oriented frameworks—such as the innovation facets created by the OECD Observatory of Public Sector Innovation (OPSI) (OECD, 2021)—have primarily addressed general public sector innovation strategies rather than those specifically tailored to digital innovation. Thus, an important knowledge gap remains regarding the specific strategies used by PSOs to drive digital innovation—a core dimension of public value creation (Bertot et al., 2016).

Second, the digital innovation research has yet to fully explore how PSOs simultaneously navigate diverse strategic goals (Haug et al., 2024) while managing the growing externalities of value creation (Yoo et al., 2024)—that is, addressing externally-focused activities that involve complex networks of other PSOs, businesses, and citizens alongside internal processes and structures. Although existing studies suggest that public sector digital innovation strategies should account for incremental improvements as well as deeper digital transformation (Haug et al., 2024), they have provided limited insights into how these distinct strategic orientations integrate with internal and external value creation aspects (Scupola and Mergel, 2022). We must address this gap if we are to understand how PSOs develop digital innovation strategies that generate public value.

Motivated by these gaps in the research and in practice, we ask: *What are the digital innovation strategies employed in the public sector?* To answer this question, we collected a unique dataset of in-depth semi-structured interviews with senior digital innovation managers in the public sector from 25 cities and 18 countries and combined manual qualitative text analysis with a Structural Topic Modeling (STM) approach. The sequential approach enables the two methods to complement each other. The qualitative analysis serves as the primary basis for drawing inferences, and the STM (Roberts et al., 2019), applied as post hoc analysis, informs and validates the findings by offering structured, data-driven insights. This provides a more comprehensive understanding of the research problem (Isoaho et al., 2021; Pugliese et al., 2024).

Our analysis of the interviews uncovered four digital innovation strategies: enhancement-oriented, anticipatory, adaptive, and persistent. The enhancement-oriented strategy and the persistent strategy were the most prevalent, reflecting a strong emphasis on internal value creation activities, such as IT modernization, process optimization, and embedding digital capabilities within governance structures.

The findings also indicate a balanced strategic goal orientation, with PSOs pursuing both incremental and transformational goals. Incremental goals focus on digitizing and optimizing existing products, processes and services, while transformational goals address future technological and societal shifts as well as the transformation of an organization's culture and structures to ensure that digital innovation becomes persistent. STM reinforced these findings by uncovering recurring topics such as service optimization through digitalization in enhancement innovation, future-oriented exploration of technologies in anticipatory innovation, service adaptation to societal needs in adaptive innovation, and anchoring digital innovation through changes in an organization's culture and structures, supported by internal rules and procedures, in persistent innovation.

These findings make two primary contributions to the literature. First, we propose a new digital innovation strategy conceptualization in PSOs based on value creation activities' foci and on strategic goal orientation. Drawing on international data from diverse public sector contexts, our findings extend the OPSI framework (OECD, 2021), specifically to digital innovation in the public sector, an area where its applicability has remained underexplored. While the OPSI model provides a general categorization of public sector innovation strategies, our findings reveal the necessity for a new digital innovation strategy,

persistent innovation, which is distinct from mission-oriented innovation (Kattel and Mazzucato, 2018).¹ Unlike mission innovations, which are designed to address grand societal challenges on a large scale, persistent innovation focuses on internal value creation activities with transformational goals, embedding digital capabilities, leadership, and cultural shifts into PSOs so as to ensure sustained digital transformation over time.

Second, our findings highlight the dominant internal foci of value creation activities in public sector digital innovation strategies. Despite the growing recognition of the potential benefits of co-creation and cross-sector collaboration for digital innovation (Scupola and Mergel, 2022; Guenduez et al., 2024), our analysis reveals that PSOs strategically prioritize internal value creation activities, such as capacity-building, changes to organizational structures and cultures, and process optimization. Further, our finding of a balanced strategic goal orientation between incremental and transformational goals provides fresh insights into the ongoing debate on the nature of digital innovation strategies. While recent research (Mergel et al., 2019; Haug et al., 2024) indicates that many studies on public sector digital innovation have centered on incremental goals, such as adopting digital systems for enhanced service delivery, our findings reveal that many PSOs also actively pursue transformational goals, seeking to reconfigure governance structures and anticipate future societal needs. This dual strategic orientation broadens the debate on how digital innovation strategies are operationalized in practice (e.g., Enang et al., 2022) by demonstrating that, rather than solely focusing on incremental improvements or radical overhauls, PSOs often integrate both orientations in their strategic efforts.

The remainder of this article is structured as follows: [Section 2](#) provides relevant theoretical background, an analytical framework, and presents a typology of digital innovation strategies. [Section 3](#) details our methodology, including the research approach and the data collection methods. [Section 4](#) presents and interprets the study's main findings. [Section 5](#) covers the post hoc analysis and its results based on the STM. [Section 6](#) and [Section 7](#) discuss the findings, addressing theoretical and practical implications, limitations, and directions for future research.

2. Theoretical background

2.1. Digital innovation

Digital innovation has become a key driver of change in the public sector, where PSOs face increasing pressure to improve services, respond to citizens' needs, and adapt to technological change. To provide a conceptual foundation, we draw on Hund et al. (2021), who define digital innovation as the “creation, adoption, and exploitation of inherently unbounded and value-adding novelty (e.g., products, services, processes, or business models) through the incorporation of... technology” (p. 2). This definition highlights the transformative potentials of digital tools to generate novel solutions, extending innovation beyond mere technology adoption to include strategic reorientation and innovation management (Van Looy, 2021).

Digital innovation goes beyond traditional innovation by utilizing technologies such as digitalized databases, networked computing, and early Internet protocols (Ayres and Williams, 2004), facilitating the development of enterprise resource planning (ERP) systems, customer relationship management (CRM) platforms, and supply chain management systems (Hendricks et al., 2007). These early advances optimized operational efficiency and resource allocation, and enhanced decision-making (Choi et al., 2010). Building on these foundations, more recent technologies—such as artificial intelligence (AI), big data analytics, the Internet of Things (IoT), blockchain, and cloud computing—enable

¹ The four original strategies identified in the OPSI framework (OECD, 2021) are enhancement-oriented, anticipatory, adaptive, and mission-oriented.

businesses to implement personalized marketing strategies, develop platform-based business models, and create real-time, data-driven customer experiences, significantly reshaping competitive dynamics across industries (Nambisan et al., 2017; Ciriello et al., 2018). Thus, digital innovation represents more than merely the evolution of how technologies are used; it constitutes major shifts in organizational operations, stakeholder engagement, and value delivery. In the private sector, digital innovation is predominantly associated with competitive advantage, agility, and market disruption (Yoo et al., 2024; Chan et al., 2019), where digital platforms and big data enable firms to re-engineer business models and drive exponential growth (Henfridsson et al., 2018). In contrast, the public sector literature situates digital innovation in the broader context of public value creation (Panagiotopoulos et al., 2019; Maione et al., 2024). Here, the focus is on harnessing digital technologies to redesign service delivery, improve engagement with citizens, enhance transparency, and overcome bureaucratic obstacles (Tate et al., 2018). Thus, digital innovation represents a multifaceted interplay between technological advances, strategic adaptation, and value creation.

2.2. Digital innovation strategies in the public sector

Innovation strategy is broadly defined as “the set of understandings and moves by which an organization leverages innovation to create and capture value, setting priorities among opportunities” (Denicolai and Previtali, 2023, p. 1). A growing body of research has explored innovation strategies in PSOs, focusing on broad policy-driven frameworks and organizational strategies that influence the adoption of innovation (Borins, 2001; Windrum, 2008). A commonly referenced framework for analyzing public sector innovation is the OECD’s OPSI framework, which suggests a strategic portfolio approach for public sector innovation and conceptualizes four primary strategies. The first, *enhancement-oriented innovation*, focuses on incremental goals such as improving existing processes and services to increase efficiency and effectiveness, building on internal value creation activities. The second, *adaptive innovation*, focuses on incremental goals to adapt to emerging changes in an external environment, such as societal and technological shifts, via external value creation activities such as co-creation and experimentation with citizens. The third, *anticipatory innovation*, focuses on transformational goals to explore and prepare for emerging uncertainties that may shape future priorities, and involves engaging in external value creation activities such as horizon-scanning and foresight. The fourth, *mission-oriented innovation*, establishes clear outcomes and overarching objectives for achieving specific societal missions to tackle grand challenges (OECD, 2021, 2022). Mission-oriented innovation has also been advanced by scholars (e.g., Kattel and Mazzucato, 2018) to illustrate how governments can steer innovation activities in the broader economy to generate social value.

The OPSI framework, developed through extensive literature reviewing and stakeholder engagement (see OECD, 2022) offers a useful foundation for understanding general innovation strategies in the public sector. However, it does not sufficiently explain how digital innovation strategies are formulated and executed. Unlike general innovation, digital innovation introduces unique dynamics to capture value from opportunities, including network and platform effects, data-driven governance, heterogeneity, and the blurring of boundaries between service providers and users (Li et al., 2022; Mariani and Nambisan, 2021).

Digital innovation practices emerge from the complex interplays between technology adoption, institutional contexts, and stakeholder engagement (Yoo et al., 2024), making them inherently dynamic and evolving. These dynamics necessitate flexible and adaptive strategies if we are to design and optimize organizational and data architectures, and adapt to socio-technical externalities and the rapid pace of technological development (Yoo et al., 2024; Gong et al., 2020). Thus, PSOs must go beyond traditional innovation frameworks and should adopt tailored

digital innovation strategies that align technological opportunities with institutional and societal needs (Bygstad and Øvrelid, 2020).

Digital innovation strategy has been defined as an “organizational strategy formulated and executed by leveraging digital resources to create differential value” (Bharadwaj et al., 2013, p. 472). We consider strategies not as static plans, but as the outcomes-oriented, recurring, consequential activities undertaken by practitioners in organizations (Jarzabkowski et al., 2021). From this perspective, strategy is seen as something people *do* through their daily practices, decisions, and interactions, rather than as something organizations *have* (Seidl et al., 2024). Digital innovation practices likewise emerge from the complex interplays between technology adoption, institutional contexts, and stakeholder engagement (Yoo et al., 2024), making them inherently dynamic and evolving. Hence, digital innovation strategies are dynamic, forward-looking goals that guide organizations in utilizing emerging digital technologies and understanding emerging externalities to create and capture value by transforming business models, optimizing processes, and enhancing user experiences (Hund et al., 2021).

This approach also aligns well with understanding digital innovation strategies in the public sector, where the consequences of both small-scale optimizations and large-scale transformations are significant and often interdependent (Haug et al., 2024). The success of digital innovation in the public sector requires strategic goals and activities to align technological opportunities with institutional goals and societal needs (Bygstad and Øvrelid, 2020; Kromidha and Córdoba-Pachón, 2017). Digital innovation strategies must navigate unique challenges such as bureaucratic rigidity, resource constraints, and the need for transparency and accountability as well as delivering resilient public services, while simultaneously capitalizing on the transformative capabilities of digital technologies (Bertot et al., 2016). Digital innovation strategies in public administration extend beyond the mere digitalization of existing processes; they involve the strategic integration of technologies such as AI, big data, IoT, blockchain, and cloud computing to create new value, enhance decision-making, and enable real-time responsiveness (Janssen et al., 2017). Importantly, digital innovation in the public sector is not a static achievement but forms part of a dynamic and evolving process (Pedersen, 2020). Digital innovation strategies must therefore balance short-term optimizing or incremental goals, such as improving operational efficiency, with long-term ambitions for systemic transformation (Haug et al., 2024). This balancing act requires the setting of strategic goals and the execution of activities to achieve these goals in practice, a concept further explored through the lenses of strategic goal orientation and the activities’ foci.

This study builds on these insights to develop a more precise conceptualization of digital innovation strategies, examining how PSOs align technological opportunities with governance structures to create and sustain public value.

2.3. Theoretical framework

2.3.1. Strategic goal orientation: incremental vs. transformational goals

In the context of digital innovation in the public sector, strategic considerations can be oriented toward either incremental or transformational goals (Haug et al., 2024). Incremental goals focus on incremental improvements that utilize digital technologies to enhance efficiency, optimize existing processes, and stabilize digital infrastructure. These goals seek to improve service quality, reduce operational costs, and simplify workflows without fundamentally altering PSOs’ structures or functions (Mergel et al., 2019). These goals aim to ensure that PSOs have the technological resilience and operational agility needed to adapt to digital demands (Mergel et al., 2018). While often perceived as modest in scope, incremental goals are critical in building the technological foundation necessary for future digital innovations. By addressing immediate operational challenges and enhancing institutional capacities, they create conditions for more ambitious digital innovation initiatives (Urbini et al., 2022). Enhancement-oriented and

adaptive innovation strategies in the OPSI framework reflect an incremental orientation by focusing on improving existing services and processes.

In contrast, transformational goals seek to fundamentally reconfigure PSOs' governance structures, service delivery mechanisms, and architecture (Anggara et al., 2024). These goals are characterized by their ambition to disrupt traditional models, foster systemic change, and create new public value types. Transformational digital innovation often involves the integration of advanced and smart technologies, such as AI, predictive analytics, and blockchain, enabling new approaches to decision-making, service design, and engagement with citizens (Prihatmanto et al., 2024). Achieving these goals requires that one rethink organizational functions, develop new competencies, and adopt forward-looking strategies that anticipate future societal needs and technological advances (Gong et al., 2020). Transformational goals aim to not only improve outcomes but also to redefine public institutions' roles in an increasingly digital society (Eom and Lee, 2022). Anticipatory innovation in the OPSI framework exemplifies this orientation by enabling PSOs to detect emerging trends, explore long-term scenarios, and proactively design digital strategies that are resilient to future uncertainties.

The relationships between incremental and transformational goals are iterative and dynamic, rather than linear or mutually exclusive. Incremental improvements often serve as precursors of systemic transformations, providing the necessary infrastructure, capabilities, and organizational readiness for more radical innovations (Luna-Reyes and Gil-Garcia, 2014). Conversely, transformational initiatives can generate new opportunities for further optimization, creating a continuous cycle of improvement and adaptation (Feller et al., 2011). Effective digital innovation strategies in the public sector must balance these two orientations, aligning short-term enhancements with long-term visions for change to achieve sustainable, meaningful public value creation.

2.3.2. Value creation activities' foci: internal vs. external

Value creation activities are the practical mechanisms through which strategic goals are operationalized, translating high-level objectives into tangible actions (Bowman and Ambrosini, 2007). The foci of activities in innovation strategies refer to the specific efforts undertaken to achieve strategic goals, which can be directed either internally or externally (Chen et al., 2020a, 2020b; Demircioglu and Audretsch, 2024). Internally-focused activities for digital innovation include the deployment of advanced IT systems (Tseng et al., 2008), the digitalization of administrative tasks such as document management (Busch et al., 2018), and the migration of data storage to cloud-based platforms (Liang et al., 2017). PSOs also engage in developing cybersecurity protocols (Frändell and Feeney, 2022) and establishing digital training programs for staff (Dawes et al., 2004). These activities are the practical steps that organizations take to integrate technologies into their internal operations. Enhancement-oriented innovation strategy in the OPSI framework reflects this internal value creation focus.

Externally-focused activities in digital innovation involve continual engagement with technological trends, social changes and needs, and stakeholders' demands. PSOs scan and observe social and technological trends, including monitoring cutting-edge digital tools, tracking best practices from other parts of a government, and understanding citizens' needs and complex societal problems (Arundel et al., 2015; Gong and Li, 2023). These activities often include interactions with citizens, NGOs, and universities as well as intergovernmental collaboration (Guenduez et al., 2024; Nowacki and Monk, 2020). PSOs also engage in foresight activities, mapping out potential responses to predicted societal and technological shifts (Vecchiato and Roveda, 2014). In parallel, PSOs carry out external stakeholder mapping and consultations to identify evolving demands by citizens or businesses (Mu and Wang, 2022). Techniques such as user-centered design are applied to tailor digital solutions to external stakeholders' specific needs (Weigl et al., 2024). Social media analytics (Wukich and Mergel, 2016) and digital feedback

platforms (Chen et al., 2023) are used to collect real-time inputs from the public, while open data platforms (Bonina and Eaton, 2020) and crowdsourcing tools (Lenart-Gansiniec, 2021) are also employed for external interactions.

Governments also form partnerships with private technology firms to co-create innovative digital services and solutions for enhanced planning and service delivery (Ma et al., 2023). These activities collectively shape how PSOs interact with their external environments, continually adapting to technological advances and societal changes so as to create public value through digital innovation. Adaptive, anticipatory, and mission innovation strategies in the OPSI framework reflect this external value creation focus, as they emphasize ongoing engagement with external stakeholders, societal needs, and emerging technologies to co-design and co-implement innovative solutions.

The distinction between internal and external activities in digital innovation is fluid, as interplays between them create a reinforcing cycle (Hietala and Päiväranta, 2025). Internal activities, such as optimizing systems and infrastructure, enhance a PSO's capacity for external engagement by enabling more responsive and efficient service delivery. Conversely, insights from external activities, such as interactions with citizens and stakeholder collaborations, inform internal processes, driving continual adaptation and improvement (Favoreu et al., 2024). This dynamic relationship highlights the necessity of a hybrid and agile strategic approach, in which PSOs flexibly combine internal and external activities to simultaneously address incremental goals—focused on optimizing existing processes, and transformational goals, focused on fundamentally reconfiguring service delivery and governance structures.

3. Methodology

3.1. Research approach and data collection

To identify digital innovation strategies, we interviewed 25 Chief Digital Officers (CDOs) from PSOs (municipal governments). As senior executives specifically tasked with driving digital transformation (Haffke et al., 2016; Singh et al., 2020; Tumbas et al., 2020), CDOs offer a consistent and comparative perspective on digital innovation strategies. However, we recognize that digital innovation in the public sector is led by individuals with various titles; further, in many cases, roles such as Chief Information Officers (CIOs), Chief Technology Officers (CTOs), and CDOs overlap or evolve to meet organizational needs (De Tuya et al., 2020). This is also illustrated in our data. For instance, in Munich, CDOs simultaneously served as CIO and CDO; in Rome, the CDO also held the title of Chief of Digital Transition; and in London, the CDO was responsible for London-wide digital transformation, data, and smart city initiatives. Thus, in many cases, there was no clear-cut distinction between CDOs and other innovation-related roles. In many cases, CDOs have multiple roles, responsibilities, and even job titles, underscoring the adaptability of these positions in response to diverse public sector demands. Further, digital innovation extends beyond formal leadership roles, with key contributions from data scientists, engineers, and other specialized practitioners (Demircioglu and Audretsch, 2024). While we consider CDOs to be representative figures, we recognize that public sector digital innovation is a collaborative effort shaped by various roles and evolving responsibilities.

We adopted a qualitative interpretative research approach (Walsham, 1995), which generally helps one to understand human actions in social and organizational contexts, and often yields deep insights into a phenomenon (Klein and Myers, 1999). As suggested by Wilson and Mergel (2022), we initially conducted a comprehensive review of the relevant literature to develop a theoretical foundation of different digital strategies. These first-order concepts served as a basis for coding the interview data, enabling the identification and organization of interviewees' responses that delineated specific strategies. We then conducted semi-structured interviews (Myers and Newman, 2007), which

served as “the primary data source” because, in an interpretative study, interviews allow a “researcher [to] best access the interpretations [of] participants” and “capture peoples’ interpretations in [as] effective [a] way as possible” (Walsham, 1995, p. 78). We applied purposive sampling to select interviewees (Patton, 2014). We conducted 25 interviews between March 2021 and August 2022. The main objective in the interviews was to gain a comprehensive and in-depth understanding of digital innovation strategies that respondents perceived as practically significant and relevant. We used a three-stage process to identify interviewees working in public sector agencies at the municipal level. First, we conducted a Google search using the following terms: ‘chief digital officer,’ ‘public administration,’ ‘public governance,’ and ‘public sector.’ This led to more than 300 million results. Following Casino et al. (2019) and Jobin et al. (2019), we limited the screening to the first 300 results and identified the contact information. Second, in LinkedIn, we searched for further CDOs in municipal governments and contacted them via e-mail or LinkedIn. Third, we used snowball sampling (Biernacki and Waldorf, 1981), asking each interviewee to name other potential interview partners who may provide further insights on our topic. We applied this method to expand the interviewee sample, as it leverages the personal networks of professionals well versed in the subject matter and makes available unique insights from trusted individuals. Through snowball sampling, we were able to conduct additional interviews and to enrich our data.

Our participants were from Europe ($n = 14$), South America ($n = 3$), North America ($n = 2$), Asia ($n = 3$), and Oceania ($n = 3$). They were geographically spread across the globe, and all worked in public agencies (e.g., were government employees). We conducted interviews in larger cities such as London (UK) and Rio de Janeiro (BR) as well as more provincial towns such as St.Gallen (CH) and The Hague (NL). By interviewing several practitioners with different work experience levels and located in very different municipalities and geographies, we were able to mitigate biases in the interview data and capture a wide range of roles, responsibilities, and experiences. This approach allows for a more comprehensive understanding of digital innovation strategies across various settings. The interviews lasted between 45 and 75 min, and were conducted and recorded through video-conferencing tools. Recording offered us full descriptions of what was said during the interviews (Walsham, 1995) and allowed for the information to be transcribed verbatim for subsequent data analysis.

The conversations all began with an introduction to each interviewee’s personal background, including their hiring, duration in their role, and how their position was embedded in the administration’s organizational structure and digital innovation strategies. Finally, we explored their understanding of digital innovation in the public sector and asked for examples of innovative practices used by their teams, agencies, and municipal governments. This helped us to capture their perspectives and perceptions of digital innovation in the public sector.

3.2. Data analysis

All recordings were transcribed verbatim, and a thematic data analysis was conducted using Atlas.ti software. Following Wilson and Mergel (2022), we used a combination of deductive and inductive analyses in a five-step process (Table 1).

First, we reviewed the OECD OPSI innovation facets (i.e., enhancement-oriented, anticipatory, adaptive, and mission-oriented innovation types) in the public sector, which served as a theoretical starting point. OPSI facets represent distinct strategic approaches, each serving different purposes in PSOs (Kaur et al., 2022). The framework has been used in the academic research to analyze innovation in the public sector (e.g., see Cole, 2022; Ramalingam and Prabhu, 2020).

We then used the OPSI framework to code the interview data, identifying interviewee responses that described specific digital innovation strategies. This deductive coding phase was followed by an inductive step in which we identified specific aspects (e.g., goals and

Table 1
Analytical process.

Phase	Output	Example
Review of the literature	Initial theoretical start-list based on the OECD OPSI facets of digital innovation	Anticipatory innovation
Deductive coding of the interview data	Identification of relevant sections of interview responses that described digital innovation strategies	“So, to implement your strategy, you need to have vision, that’s for sure. You need to know where you’re going.”
Inductive coding of the interview data	First-order codes	Specific activities to put a digital innovation strategy into action “Improving products and services”
Grouping first-order codes	Second-order concepts	Digital innovation goals “Enhancement-related goals”
Sorting second-order concepts	Aggregate dimensions	Digital innovation strategies, “Anticipatory innovation”

primary activities) of digital innovation strategies. Through this analysis, we identified recurring patterns, themes, and codes that provided deeper insights into the data and facilitated extensive discussion among the research team. In the next stage, we compared the deductive first-order concepts to the first-order codes and grouped the codes into second-order concepts.

Our systematic and transparent approach ensured that the findings would be rooted in the participants’ de facto responses. To ensure credibility and trustworthiness, we followed Pratt’s (2009) recommendations for data reporting in qualitative studies. Example quotes from our coding process are provided in our results section. Additional quotes are presented in Table 2. This rigorous analysis of the interview data formed the basis of our analysis and our ultimate conclusions.

Transcripts were read and coded independently by two of the researchers. Both coders are fluent in the two interview languages, English and German. To ensure a robust analysis, two researchers independently analyzed the interview data to develop themes, concepts, and findings. This involved screening the answers to each research question to gain familiarity with the data. Throughout the analysis, ongoing conversations between the coders were crucial to refining and rearranging the categories, labels, themes, and subthemes. To strengthen the findings’ validity, relevant quotes from the interviews were selected to provide additional support regarding the agreed-upon concepts and codes. The codes and concepts were also reviewed and discussed with the third member of the research team, who provided valuable critical inputs. This iterative process led to further refinement of the categories, their descriptions, and the order in which they appeared. Along with the qualitative analysis, we also identified additional patterns based on the frequency of concepts in the interview data, following White and Marsh (2006) and in line with Mergel et al. (2019) as well as Wilson and Mergel (2022).

Finally, the coding framework—including the final codes, categories, and themes—was reviewed and discussed until a consensus was reached. This collaborative effort ensured a comprehensive and reliable representation of the data. Fig. 1 depicts the data structure and presents the results of our in-depth coding process. Following recommendations for data reporting in qualitative research (Pratt, 2009; Kapturkiewicz, 2022), we present example interview quotes in our findings section (Section 4) as well as additional quotes in Table 2 to support our interpretations.

4. Findings

We examined the digital innovation strategies used by practitioners in the public sector. We drew on Hund et al.’s (2021, p. 2) definition of digital innovation as “the creation, adoption, and exploitation of

Table 2
Representative interview quotations.

Digital innovation strategy	Representative quotations
Enhancement-oriented innovation	• “Efficient resource allocation, efficient money allocation, efficient project working, going from projects of one-and-a-half years to being more selective and going to projects of six to nine months with a clear scope, and so on and so on” (Interview #1). • “So, it’s not innovation as a goal, it’s innovation as a tool to improve the current way of working” (Interview #5). • “To be very aware of the problem you want to solve and be very aware if you’re bringing a solution, or if you should get out and not bring a solution because it’s making things worse instead of better” (Interview #16).
Anticipatory innovation	• “So, it’s a combination of us planning, a need from the service, trends we’re seeing outside, and common sense” (Interview #8). • “And I think the role is moving to a more proactive role to look for opportunities, to take opportunities instead of waiting for somebody to ask them to act” (Interview #16). • “We from the public service departments, we do surveys on what citizens have as main annoyances living in the city. And what they liked the most. And that’s how we knew, OK, litter on the street is the biggest annoyance for citizens in city X” (Interview #16).
Adaptive innovation	• “So, for me, agile delivery, user-centered research, service design, customer experience focus are skills that we need” (Interview #8). • “So, people demand digital services, like they don’t want to go to a public building and to be there for like 4 h in a queue to get something, to get some issue resolved by the public institution” (Interview #12). • “My role is mainly outward-looking. So, 80 % of the time, it’s about how we set the strategic direction for digital transformation” (Interview #9).
Persistent innovation	• “Digital maturity is not just about the tech you’re using, it’s about the culture. It is also about enabling, you know, other parts of the organization to get on with things as well” (Interview #4). • “It’s a challenge to communicate that... you will do everything differently, but it will be better. Believe me. Trust me” (Interview #12). • “There is this issue where you say ‘OK, leadership, that’s more the emotional responsibility you have.’ So, taking people with you by having a vision, by shaping the change together” (Interview #19).

inherently unbounded and value-adding novelty (e.g., products, services, processes, or business models) through the incorporation of [...] technology.” Conceptually, we relied on the OPSI framework, which highlights key facets of public sector innovation and conceives strategy as a structured, goal-oriented approach that helps PSOs to achieve their objectives. Our analysis revealed four distinct digital innovation strategies—enhancement-oriented, anticipatory, adaptive, and persistent—used by PSOs to digitally innovate. We will now present each strategy, detailing its primary goals and the key activities that enable effective implementation of digital innovation in the public sector.

4.1. Enhancement-oriented innovation

4.1.1. Goals

Our analysis revealed that enhancement-oriented innovation primarily seeks to increase the efficiency and effectiveness of existing services and processes, while ensuring the IT infrastructure’s stability. Based on our data, it is the most prevalent strategy, with 30 % of the codes assigned to it. According to Interview #16, internal stakeholders are particularly focused on “increasing the efficiency of the municipality and the quality of service.” The overarching goal is to “digitalize services

and reduce the cost for citizens” (Interview #13). Specifically, enhancement-oriented innovation encompasses improvements in efficiency, service quality, effectiveness, digitalization, and service or process delivery (Interviews #1, #16, #19). This innovation strategy also involves “efficient resource (re)allocation, efficient money allocation, [and] ways of project working” (Interview #1).

We found that the outcomes of enhancement-oriented innovation target both citizens’ satisfaction and internal operational efficiency. This innovation type also extends beyond individual processes and services, often focusing on the maintenance and enhancement of entire ecosystems (Interview #15). This includes the maintenance of basic IT infrastructure, workspace technologies, data centers, and analytics in core administrative functions, as well as department-specific systems such as educational technologies in schools (Interviews #15, #16). Thus, this innovation strategy considers digital tools as the main enabler for improving services and processes. An example of this digital innovation strategy is Niterói, a city that has focused its strategy on enhancing administrative processes and improving IT infrastructure. This strategy followed the logic of mapping existing workflows, renewing IT infrastructure, and then redesigning the process for online delivery (Interview #12).

4.1.2. Primary activities in enhancement-oriented innovation

The enhancement-oriented innovation strategy focuses on two primary activities: 1) improving the current administrative processes and 2) upgrading products and services. First, the evaluation and enhancement of existing IT infrastructure and communication systems have a critical role in improving administrative processes (Interviews #9, #10). This involves ensuring that public sector agencies have robust digital systems that are capable of integrating IoT and other advanced digital technologies (Interviews #9, #10, #2). For instance, the implementation of 5G fiber-optic access was highlighted as a key task by Interviewee #9. These internal activities are essential for improving connectivity, facilitating the seamless exchange of information, and harmonizing digital infrastructure to ensure that technologies are “similar or compatible” (Interview #12).

The second key activity to achieve an enhancement-oriented digital innovation strategy focuses on upgrading existing products and services. This typically involves digitizing analog products and services and enhancing current offerings. Interviewee #1, for instance, emphasized the importance of building on existing projects and innovations to avoid “reinventing everything from scratch again, all over again, every time.” By learning from past implementations, organizations can more effectively refine and improve their products and services.

4.2. Anticipatory innovation

4.2.1. Goals

Anticipatory innovation was the second digital innovation strategy identified by our analysis (22 % of the codes). Practitioners often do not clearly distinguish between mission-oriented and anticipatory innovation, as both strategies focus on foreseeing and preparing for future challenges and opportunities. We therefore consolidated these concepts under the umbrella of anticipatory innovation.

The primary goals of anticipatory innovation are 1) to explore and identify new services, products, business models, values, and technologies, and 2) to anticipate social and technological trends that require immediate action. Practitioners who use this strategy proactively are addressing future challenges and opportunities to inform decision-making. As Interviewee #5 explained, this approach requires a clear understanding of current technologies and the identification of potential innovations to enhance services and processes: “This innovation strategy requires practitioners to identify the best uses of current technologies and potential products that could revamp the available services and processes.” New technologies often set new directions and orientations for PSOs, highlighting anticipatory innovation’s role in setting a

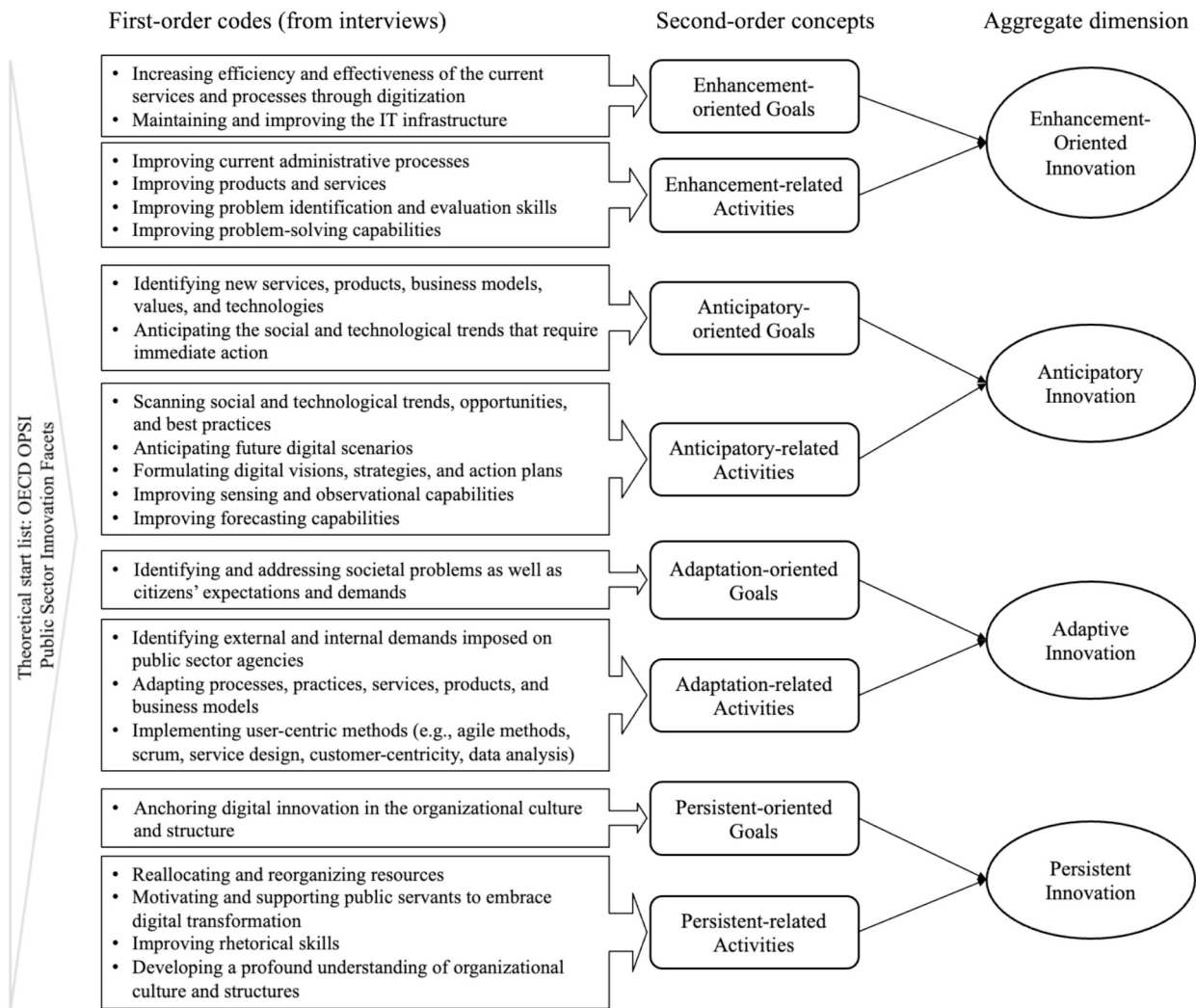


Fig. 1. Data structure.

forward-looking agenda.

Implementing new technologies in anticipatory innovation also involves adapting methods, such as agile approaches, to prepare for future demands (Interviews #9, #16). Further, the interviewees emphasized that digital policies and technologies often require reform to remain aligned with anticipatory innovation's goals. As Interviewee #9 pointed out, continual adjustments to policy frameworks are often necessary to meet emerging needs and technologies.

4.2.2. Primary activities in anticipatory innovation

The primary activities associated with anticipatory innovation include: 1) scanning social and technological trends, opportunities, and best practices; 2) anticipating future scenarios; and 3) formulating digital strategies, policies, and action plans.

Agencies that operate in rapidly changing environments must scan social and technological trends, opportunities, and best practices. This enables agencies to remain informed and forecast relevant changes in their field. As Interviewee #5 noted, remaining current requires a proactive approach: "In rapidly changing environments, it becomes crucial to understand, predict, and forecast these changes." Such trend analysis also allows public sector agencies to learn from others' actions, as described by Interviewee #21, who emphasized the value of observing and adapting best practices: "Anticipation involves moving to a more proactive role to look for opportunities... and... take them instead of waiting for them to arise." This proactive scanning enables agencies to

remain responsive to emerging developments.

Besides scanning, anticipatory innovation involves translating future digital scenarios into concrete strategies, policies, and long-term visions through external engagement. For instance, Interviewee #9 discussed their agency's use of a mission-oriented approach to develop their city's plan, highlighting digital access as one of nine critical tasks. This approach underscores the importance of setting mid- and long-term visions to establish a clear roadmap. Similarly, Interviewee #19 described their strategy of preparing for digital administration and a "digital city" by anticipating ways to lower barriers for citizens accessing digital platforms: "What... the city [can] do to lower the barriers for citizens to use digital platforms." This anticipation of future needs supports a strategic approach to digital transformation. Understanding the direction of digital transformation is central to anticipatory innovation, as emphasized by Interviewee #16. This kind of forward-looking thinking is exemplified by the city of Rome, where anticipatory innovation is realized through the Rome Data Platform by understanding the needs of users to inform service designs and policymaking. As Interviewee #5 explained, "So, it's a process that starts with analyzing the needs of the users and then mov[es] to understanding the assets we have today. And imagine a scenario where we're taking advantage of the different ways of interacting offered to us by a new technology, and consequently design[ed] this digital transformation... from the current process to the future one." This process highlights how anticipatory innovation requires envisioning future interactions and adapting current processes

via external engagement to prepare for them.

4.3. Adaptive innovation

4.3.1. Goals

Adaptive innovation was the third innovation strategy identified in the interview data and had the lowest prevalence, with 18 % of the codes aligning with its goals and primary activities. This strategy is reactive; it seeks to understand existing societal problems and to respond to citizens' demands by developing new processes, services, products, and business models. Unlike enhancement-oriented innovation, which seeks to overcome inefficiencies through digitalization, adaptive innovation is more outward-looking, placing a greater emphasis on interactions with users. Interviewee #16 illustrated this outward focus on engaging with citizens by asking: "How do I use the digital tools and the digital possibilities to improve the service? To be perceived as a service provider? Now, of course, especially on the outside edge (i.e., for the citizens)." Here, the emphasis on digital tools as a way to enhance interactions with citizens highlights the strategy's user-centered approach.

As, in this strategy, innovation occurs in response to external factors, its success largely depends on PSOs' ability to recognize changing citizen needs and expectations, and then to respond with appropriate services, products, and solutions. For instance, Interviewee #21 emphasized the importance of user proximity in adaptive innovation: "The main thing is to be closer to the customers. This is the main axis. That means closeness, better understanding of needs, so that we can bring solutions." Similarly, Interviewee #16 noted that addressing societal problems through digitalization opportunities is central to their agency's approach. Thus, public sector agencies react to evolving demands by implementing new policies and IT systems, as well as by developing user-friendly services, processes, products, and communication interfaces. In Tel Aviv, for instance, adaptive innovation is focused on simplification and involves reassessing legacy procedures to ensure continued relevance. As Interviewee #23 explained, "We're trying to simplify the processes. And to find out if something was relevant twenty-five years ago, whether it's relevant today... So, you don't have to try and prevent [problems] that no longer exist."

4.3.2. Primary activities in adaptive innovation

The data revealed that the primary activities in adaptive innovation are: 1) identifying external and internal demands on public sector agencies; 2) adapting processes, practices, services, products, and business models accordingly; and 3) implementing user-centered methods such as agile methods, scrum, service design, customer-centeredness, and data analysis.

Identifying demands involves recognizing the requirements of users, partners, employees, political agendas, and other interest groups. Interviewee #6 highlighted the external pressures faced by public agencies: "high demands from the population, who expect governments to catch up." This sentiment captures rising expectations that governments must respond to technological trends. Besides external demands, the data also showed a strong appetite for innovation in various public sector bodies (Interview #9), indicating the need for a deeper understanding of these groups' concerns, needs, and expectations.

The active adaptation of processes, practices, services, products, and business models in response to external engagement is a core activity in adaptive innovation. This approach goes beyond basic digitalization or IT project implementation, focusing instead on improving user experiences. Interviewee #22 explained the need for continual user engagement to create solutions that are truly user-centered: "This approach differs from traditional IT projects because it demands ongoing engagement with users." By making user interactions more digital, adaptive innovation strategies enhance user experiences and designs, as noted by Interviewee #5. Further, while the solutions implemented may be novel in an agency, the data showed that they often align with established market practices (Interviews #4, #11). This indicates that

the adaptive innovation strategy responds to both external market trends and internal demands, enabling agencies to develop processes, services, products, business models, and practices that resonate with broader societal shifts.

4.4. Persistent innovation

4.4.1. Goals

Persistent innovation was the fourth digital innovation strategy identified in our analysis. It extends beyond the strategies outlined in the OECD framework and was strongly prevalent in the interview data, with 28.75 % of the codes aligning with it. Persistent innovation seeks to embed digital innovation in the organizational culture and structures of public sector agencies; it requires both cultural and organizational change. Public sector institutions that adopt this strategy face the challenge of sustaining innovation in the long term by fostering an innovation-friendly mindset, empowering employees with new competencies and adapting an organization's structures. As Interviewee #9 noted, this strategy demands shifts in both a PSO's culture and structures to support long-term innovation goals. The data emphasized that this transformation involves addressing cultural barriers, promoting a positive attitude to innovation, and creating an environment that encourages experimentation, collaboration, and knowledge-sharing. For many leaders, this focus on cultural change is paramount: "Likely by far the bigger challenges for me are in the people and culture change arena than... in the technology arena." (Interview #4).

Thus, this strategy focuses on preparing employees, creating a culture of innovation, and adapting organizational structure to support innovation. This approach's goal is to deeply embed innovation in the organizational culture. As Interviewee #10 noted, effective persistent innovation requires structural flexibility: "You need to modify all organizational structures according to your demands. So, this means that the city government must change."

4.4.2. Primary activities in persistent innovation

Persistent innovation achieves its objectives through two primary internal activities: 1) the reallocation and reorganization of resources, and 2) providing support for public servants who embrace digital transformation. Additional activities include improving rhetorical skills and developing an understanding of organizational culture and structures.

Reallocating and reorganizing resources as well as building strong teams are essential to this strategy, as indicated by the interviewees. For instance, a respondent described the importance of resource allocation, explaining: "... so, actually, spending a lot of time and money and effort in getting the strong teams on those different topics that really can take the municipality further in that field" (Interview #16). This activity closely aligns with building in-house capacities by creating strong, innovative, and multidisciplinary teams. These teams bring together expertise in areas that are essential to innovation, as Interviewee #9 explained: "It's the ability to bring together a team that has the technical skills, the design skills, the project management skills, as well as the leadership skills, and putting them all together." A concrete example is Antwerp, which has established a central team tasked to ensure that insights and lessons learned from past projects are systematically integrated so as to avoid duplications and to foster alignment across strategic pillars (Interview #1). Other interviewees highlighted that the team capacities must include knowledge of the latest technologies—such as AI, cybersecurity, and digital transformation—to drive effective innovation efforts (Interviews #10, #16).

Further, motivating and supporting public servants to embrace digital transformation is crucial to embedding innovation in an organization. This involves advocating for digital innovation and fostering an innovation mindset, which requires strong leadership to empower and motivate teams. Interviewee #20 highlighted leadership's roles in guiding teams: "It includes guiding employees through the digital

transformation process in their areas of responsibility and ensuring alignment across disparate teams.” By fostering a positive attitude to innovation and embedding it in the organizational culture, this strategy seeks to sustain digital transformation efforts over time.

5. Post hoc analysis using a structural topic modeling

5.1. Structural topic modeling analysis

Following our initial qualitative analysis, we conducted a post hoc analysis using Structural Topic Modeling (STM) to explore topics in the interview data that were not identified through manual coding but could help answer our research question.

STM, like the more widely used Latent Dirichlet Allocation (LDA), is a probabilistic, unsupervised topic modeling technique for uncovering latent thematic structures in text corpora. However, STM offers several advantages that make it particularly suitable for our study. First, we included each interviewee’s institutional affiliation (e.g., Paris, Almaty, Boston) as a document-level covariate, enabling us to identify which topics were more prevalent in interviews associated with specific cities (Roberts et al., 2014). Second, STM estimates how closely topics are related to each other based on how they co-occur in the data. We used this information to support the interpretation of interrelationships between topics and to guide the model selection (Roberts et al., 2014). This approach allows qualitative analysis to guide interpretation, while topic model analysis provides a structured, data-driven layer, enhancing both the objectivity and the analytical rigor of the findings (Pugliese et al., 2024; Guenduez and Mettler, 2023).

Fig. 2 presents the four steps in our methodology; we will now detail these.

5.2. The data preparation and text processing procedure

We applied STM using the *stm* package in R (Roberts et al., 2019). Prior to analysis, we preprocessed all the interview transcripts in line with established procedures (Lucas et al., 2015; Roberts et al., 2019). The interviews in German were translated into English by two bilingual researchers to ensure accuracy and consistency. The interview transcripts are derived from 25 in-depth conversations lasting between 45 and 75 min and yielded a corpus of approximately 177,500 words, a size comparable with text corpora used in previous applications of (structural) topic modeling (Schmiedel et al., 2019). We applied standard text preprocessing steps, including tokenization (splitting text into individual words or tokens), stemming (reducing words to their root), removing punctuation, and eliminating stopwords (e.g., the, is, at), using the *textProcessor* function provided in the *stm* package (Roberts et al., 2019). The transcribed text was segmented into paragraphs of approximately 250 words to create consistent units for topic modeling—a common approach in STM research (e.g., see Guenduez and Mettler, 2023). This preparation ensured that the dataset was in an appropriate format for reliable topic extraction and interpretable modeling results.

5.3. Model estimation and examination

We began the model selection process by generating a semantic coherence plot using the *searchK()* function from the *stm* R package

(Roberts et al., 2019) with total number of topics (K) ranging from 3 to 50. By covering a spectrum from low (K = 3) to relatively fine-grained (K = 50) topic resolutions, we were able to assess the different topic models based on standard diagnostic criteria such as their semantic coherence, exclusivity, heldout likelihood, and residuals (Roberts et al., 2014, 2016). Following Roberts et al. (2014, 2016), we used semantic coherence and exclusivity as a “coarse filter” to identify promising candidate models for further evaluation. The semantic coherence plot revealed several local peaks, most notably at K = 10, 15, 20, and 23, indicating potentially high interpretability at these topic counts. Based on this combined assessment and our qualitative interpretation of the resulting topics based on the innovation facets defined in the OPSI framework, we selected K = 23 as the final solution.

5.4. Interpretation of the STM outputs

While STM identifies patterns in word usages across the interviews we conducted and organizes them into topics, it does not assign meaning to these topics (Roberts et al., 2014, 2016, 2019). That interpretation must be done by the researcher. The selected STM model (K = 23) generated a range of topic-related outputs that required qualitative interpretation. To translate these outputs into conceptually meaningful and theory-informed findings, we applied thematic analysis, which offers a suitable approach for interpreting topic model outputs by helping to identify latent patterns in the data and relating them to theoretical concepts (Isoaho et al., 2021).

To ensure consistency with our prior qualitative analysis, we used the OECD OPSI framework as the analytical lens throughout this interpretive phase. Following Braun and Clarke’s (2006) step-wise guide, we began by familiarizing ourselves with each topic through the examination of high-probability words, FREX terms, and wordclouds. From these data, we developed initial codes and began forming interpretations for each topic. We then examined 10 to 15 representative paragraphs from the interviews per topic in which the respective topic was most prominent according to the model to refine and validate our interpretations (Roberts et al., 2014; Roberts et al., 2019). Throughout this interpretive phase, we continually revisited and refined our understanding of each topic and labeled the topics.

In the next step, we grouped the identified topics into clusters. Consistent with the approach in our qualitative analysis, we used the OECD OPSI framework as the analytical lens. Topics were assigned to specific innovation strategies based on their top words and the contextual nuances derived from the representative paragraphs of the interviews. Finally, we formulated the results.

5.5. Main findings of the STM analysis

The integration of the STM as post hoc analysis strengthens the analytical depth and robustness of the manual qualitative analysis of the interview data (Isoaho et al., 2021). The STM analysis provided a more comprehensive understanding of digital innovation strategies in the public sector.

We will now summarize the STM analysis’ findings. Detailed results from the STM analysis can be found in Table B.1 in Appendix.

First, the STM results support the four digital innovation strategies we identified in the interviews. While our analysis revealed that a clear distinction between anticipatory and mission-oriented innovation could not be made when assigning topics, we identified six topics that explicitly related to the long-term integration of innovation into PSOs’ organizational cultures and structures. This strongly aligned with persistent innovation, which we identified in the qualitative analysis and which is not present in the OPSI framework. The STM revealed key aspects of persistent innovation strategy, such as the crucial roles of leadership and cultural change in sustaining innovation (Topic 23), as well as the importance of capacity-building to maintain momentum (Topic 16). These topics underscore that persistent innovation focuses

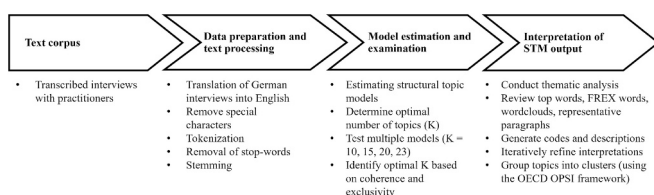


Fig. 2. Text processing procedure.

on embedding digital innovation in the organizational culture and structure to ensure long-term success. This strategy, which emerged as one of the most significant findings in both the STM and the qualitative analysis, demonstrates how PSOs work to ensure that digital innovation becomes an ingrained practice, supported by leadership and internal alignment.

Second, the STM analysis adds depth by uncovering 23 distinct topics, which provide nuance to each strategy. For instance, in enhancement-oriented innovation, Topic 19 emphasizes the use of data-driven governance to optimize services and processes, showing how PSOs leverage technology and data to achieve better outcomes. In anticipatory innovation, Topic 13 highlights the importance of sensing (i.e., detecting, interpreting, and evaluating opportunities and threats) as well as long-term planning and proactive adaptation. Together, these practices enable agencies to set strategic goals that prepare them for future technological and societal developments. In adaptive innovation, Topic 17 emphasizes the need to adapt not only individual services but entire service models (similar to business models) to address social needs through digital innovation. These findings from the STM analysis, which were less explicit in the qualitative analysis, provided a richer understanding of how PSOs operationalize each strategy.

Third, the STM analysis also validates the prevalence of these strategies across the interview data, adding rigor to the qualitative findings (Roberts et al., 2014; Guenduez and Mettler, 2023). Enhancement-oriented (33.13 %) and persistent innovation (28.52 %) emerged as the most common strategies, closely aligning with our manual coding results. This consistency between the qualitative and quantitative analyses reinforced the findings' robustness, indicating that public sector innovation efforts primarily seek to improve existing processes and to embed digital innovation into organizational structures and cultures. Anticipatory innovation (22.86 %) and adaptive innovation (15.48 %) are less prevalent, reflecting the more reactive aspects of digital

innovation, where immediate operational improvements often take precedence over future-oriented or adaptive strategies.

The STM analysis also provides additional insights into how multiple strategies coexist in practice. For instance, PSOs often focus on both persistent and enhancement-oriented innovation simultaneously, improving current processes while embedding digital innovation into their organization's culture for sustained impacts. These interplays between strategies show that PSOs may simultaneously prioritize different innovation approaches, addressing both short-term operational needs and long-term cultural change. Similarly, anticipatory and adaptive innovations may also be pursued concurrently. While anticipatory innovation focuses on long-term planning and future trends (Topic 9), adaptive innovation ensures real-time responsiveness to societal changes (Topic 17). These results indicate that, rather than pursuing isolated innovation strategies, the sample PSOs are demonstrating a capacity to integrate various approaches to meet both immediate demands and future challenges.

6. Modified framework on digital innovation strategies in the public sector

In Fig. 3, we present an adapted framework of digital innovation strategies in the public sector. It provides an overview over the four distinct innovation strategies, including the primary goals and related key activities aimed at achieving value through digital innovation in the public sector. The figure also includes the three most prominent topics identified in the STM analysis as well as example cities where these strategies were commonly observed.

The framework builds on the OECD OPSI innovation framework, extending and tailoring its typology to digital innovation strategies. Our analysis validates the prevalence of enhancement-oriented, anticipatory, and adaptive strategies. The key goals and activities of the mission-

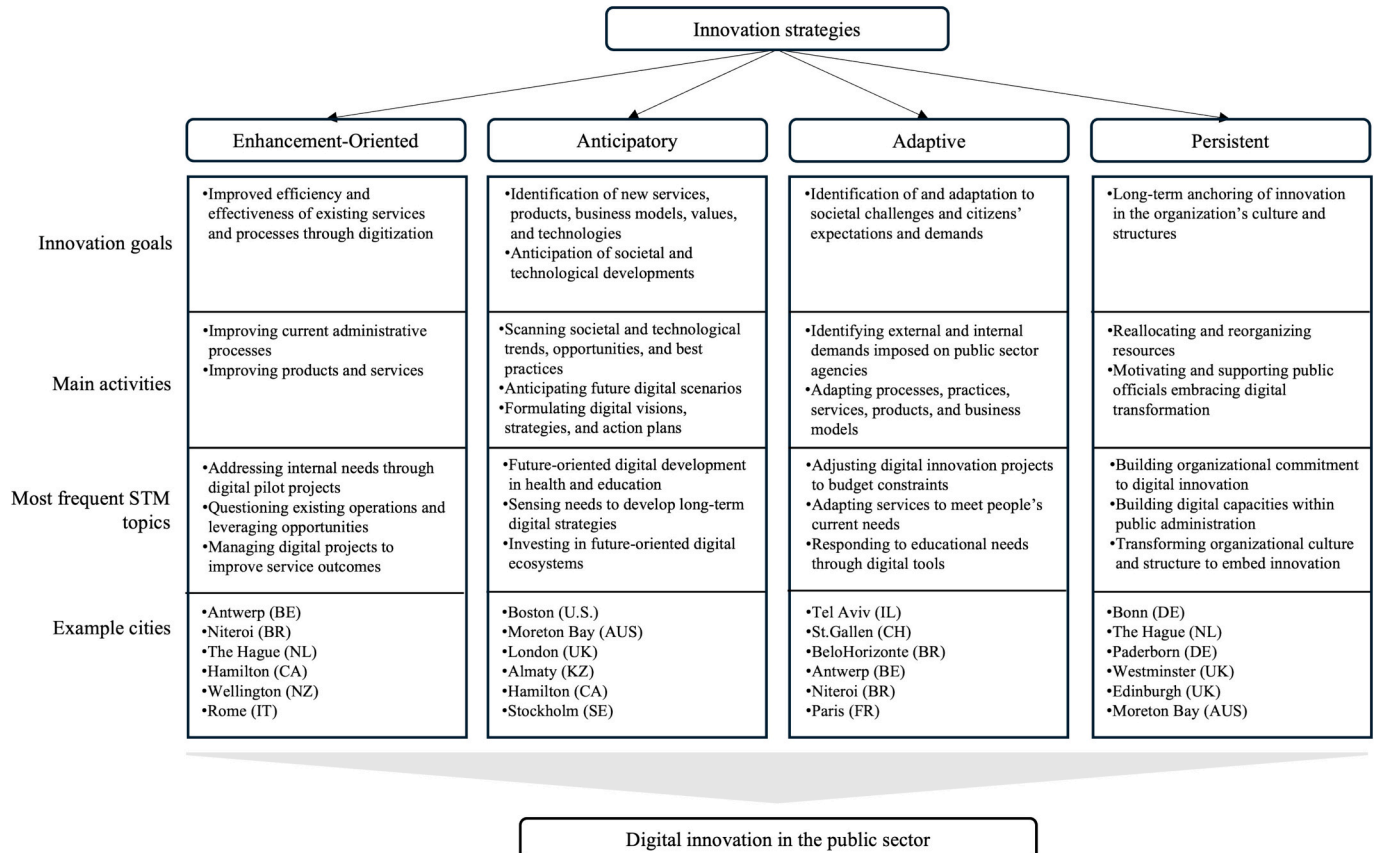


Fig. 3. A model of digital innovation strategies in the public sector.

oriented approach closely aligned with anticipatory strategy and were therefore integrated into it. Our findings from the qualitative analysis were subsequently validated and expanded through a post hoc STM analysis on topics and prevalence. Both analyses reveal persistent innovation as a fourth significant digital innovation strategy in the public sector. This section presents the modified framework and the related results.

First, enhancement-oriented innovation strategy has an incremental goal orientation, and the value creation activities' foci are internal. It targets efficiency and effectiveness of current services and processes. With 30 % of the codes assigned (and an STM prevalence of 33 %), this strategy reflects a dominant strategy in current public sector digitalization efforts. It involves incremental improvement of current processes, products, and service delivery, without fundamentally rethinking the service model, which aligns with STM Topic 19. Cities such as Niterói exemplify this approach through incremental steps such as IT modernization and workflow redesign.

Second, anticipatory innovation strategy has a transformational goal orientation, and the value creation activities' foci are external. With 22 % of the assigned codes (and an STM prevalence of 23 %), anticipatory innovation seeks to prepare PSOs for emerging social and technological developments; sensing capabilities, strategic foresight, and formulating digital visions, strategies, and action plans are key activities to achieve this goal. Topic 10 of the STM analysis underscores the focus on future-oriented digital innovation. The interviews revealed how cities such as Rome engage in anticipatory innovation by using data platforms to simulate future user needs and guide long-term planning.

Third, adaptive innovation strategy has a incremental goal orientation, and the value creation activities' foci are external. Though less dominant regarding the coding frequency, with 18 % of the codes (and an STM prevalence of 15 %), it is an important strategy for PSOs to respond to societal needs and demands. Our STM analysis reveals that this strategy includes tailoring services to local contexts, adapting educational or social programs through digital means, or implementing changes in response to users' feedback. STM Topic 17 underscores how entire service models are reshaped to meet citizens' changing expectations. This extends the results of key activities such as user-centered design and process simplification.

Fourth, the revised framework includes a new digital innovation strategy, *persistent innovation*, which extends the OECD OPSI framework. Persistent innovation has a transformational goal orientation and the value creation activities' foci are internal. Representing nearly 29 % of the coded data for both the qualitative and the STM outcome, persistent innovation involves embedding digital innovation into PSOs' culture and organizational structure. STM Topics 16 and 23 reinforce this strategy's emphasis on leadership, capacity-building, and organizational change. The underlying logic is to create the conditions that enable digital innovation and, above all, ensure its long-term anchoring in PSOs. Cities such as Antwerp for instance have established central teams to institutionalize learning and promote the continuity of innovation efforts.

Finally, these findings point out two significant results. First, the findings suggest that there is a notable difference between internally-focused and externally-focused value creation activities; the former accounts for 61.7 % (enhancement-oriented and persistent strategies), and the latter 38.3 % (adaptive and anticipatory strategies). Second, there is a relative balance between incremental goals (48.61 % enhancement-oriented and adaptive innovation strategies) and transformational goals (51.38 % adaptive and anticipatory innovation strategies). Second, our findings suggest that these strategies are not mutually exclusive. Our analysis shows that PSOs often combine approaches, which is reflected by the number of codes in different interviews. Enhancement-oriented innovation and persistent innovation emerged as the most prevalent strategies in our analysis. Complementary but less prevalent were anticipatory innovation and adaptive innovation.

7. Discussion and conclusion

We have examined digital innovation strategies in the public sector, with a focus on strategic goal orientation and the value creation activities' foci. Although digital innovation scholarship has predominantly examined the factors that influence technology adoption in the public realm (Cepparulo and Zanfei, 2021; Vickers et al., 2017; Hong et al., 2022), there has been limited research into the specific digital innovation strategies used to drive digital innovation in the public sector. Previous studies often presented a fragmented view of how PSOs engage with digital innovation (e.g., Kromidha and Córdoba-Pachón, 2017; Denicolai and Previtali, 2023), lacking a comprehensive framework for categorizing and analyzing different approaches.

We have addressed this gap by conducting in-depth interviews with CDOs from 25 cities across 18 countries, using qualitative text analysis to identify and categorize digital innovation strategies in the public sector. A post hoc application of STM complemented this approach by validating and extending the qualitative findings. Based on this combination, the study identifies four key digital innovation strategies: enhancement-oriented, anticipatory, adaptive, and persistent. Enhancement-oriented and persistent strategies emerged as the most prevalent, reflecting a strong emphasis on internal value creation activities such as IT modernization, process optimization, and embedding digital capabilities within governance structures. Our findings also indicate a balanced strategic goal orientation, with PSOs pursuing both incremental goals (e.g., digitalizing) and transformational goals (e.g., transforming an organization's culture and structures, addressing future technological and societal shifts). The findings also indicate that digital innovation strategies are not mutually exclusive, as interviewees described employing multiple digital innovation strategies. For instance, based on the interviews, we found that several respondents pursued both enhancement-oriented and anticipatory innovation strategies, while several others pursued both anticipatory and persistent strategies. Still others pursued both adaptive and enhancement-oriented strategies. These findings corroborate early studies suggesting that innovative activities—such as innovation types and outcomes—overlap (Arundel et al., 2015; Demircioglu and Audretsch, 2020; Torugsa and Arundel, 2016; Van der Wal, 2017). Thus, based on their particular needs, practitioners can use and prioritize more than one digital innovation strategy, although one strategy may be dominant.

7.1. Theoretical contributions

This study makes two major contributions to the digital innovation strategy literature. First, extending the OPSI framework by providing an empirical analysis to uncover key digital innovation strategies, we contribute to the research into digital innovation in the public sector (e.g., Hong et al., 2022; Wang et al., 2023; Wichmann et al., 2020). By integrating two dimensions—strategic goal orientation and value creation activities' foci—this study develops a novel and structured conceptualization of digital innovation strategies for PSOs. While the research has primarily examined the factors that influence the adoption of digital innovation (Cepparulo and Zanfei, 2021) and digital technologies' roles in service delivery in PSOs (Hong et al., 2022), there has been limited attention on the strategic approaches that guide digital innovation efforts. By identifying four distinct digital innovation strategies—enhancement-oriented, anticipatory, adaptive, and persistent—we refine the OPSI framework and complement the literature by offering a systematic understanding of how PSOs implement digital innovations to create public value. Additionally, the introduction of persistent innovation as a distinct strategy extends the OECD OPSI framework (OECD, 2021) by highlighting the importance of long-term institutionalization, leadership commitment, and cultural transformation in sustaining digital innovation over time. The absence of this strategy in OPSI is notable, especially as studies in the private sector emphasize persistence as crucial for sustainable innovation (Tavassoli

and Karlsson, 2015; Cefis and Orsenigo, 2001). Incorporating persistent innovation could enrich PSOs by capturing long-term requirements of digital innovations.

Second, our findings refine our understanding of value creation activities' foci and strategic goal orientation in digital innovation strategies. While much of the literature emphasizes the roles of externally-focused co-creation and stakeholder engagement in digital innovations in PSOs (Scupola and Mergel, 2022), our findings reveal that PSOs often prioritize internally-focused value creation activities, such as IT modernization and workforce capacity-building. While much of the digital innovation literature emphasizes externally-oriented mechanisms—particularly platform dynamics, stakeholder co-creation, and data-driven network effects (Yoo et al., 2024)—our results reveal a contrasting reality in PSOs and challenge the assumption that external collaboration is the primary value creation activity for digital innovation in PSOs. By differentiating between an internal and an external value creation focus and finding that activities' foci are far more internal than external, we provide supporting evidence to recent empirical findings that innovative activities' foci are internal (e.g., Demircioglu and Van der Wal, 2022) and highlight that public value creation through digital innovation in PSOs is primarily rooted in internal improvement and enhancement activities. These strategic efforts focus not only on process optimization and infrastructure development, but also on making digital innovations enduring components of organizational practice that generate lasting public value. A key reason for this internal orientation is PSOs' specific constraints and priorities: many operate with an aging infrastructure, limited resources, and strong accountability pressures, necessitating foundational internal improvements before broader collaboration is feasible. Further, PSOs often pursue digital innovation to digitize processes and service delivery, primarily through one-to-one shifts from analog to digital (Mergel et al., 2019), which inherently require inward-facing strategies.

Also, while studies have predominantly focused on incremental goals, such as digitalization and process optimization (Busch et al., 2018), we advance the digital innovation strategy literature by demonstrating that most PSOs simultaneously balance incremental and transformational goals. The latter refers to long-term changes aimed at reconfiguring an organization's culture and structures, while also anticipating and addressing societal and technological developments (Eom and Lee, 2022). Despite the fact that many studies suggest that structural and cultural barriers (Wilson and Mergel, 2022), as well as risk aversion (Brown and Osborne, 2013; Ritchie, 2014), lead PSOs to favor incremental over transformative innovation approaches, the frequent occurrence of transformational innovation strategies in our data suggests that PSOs are pursuing a balanced approach—combining incremental or ad hoc adjustments with long-term, fundamental changes to structures, processes, and culture. Overall, our findings indicate that PSOs are setting ambitious agendas for change. The four innovation strategies and their associated goals and activities reflect a wide range of innovation efforts. They illustrate how PSOs seek to ensure future viability by becoming more adaptive to external demands and developments, fostering continuous internal improvements, and embedding innovation in ways that support lasting transformation (see also Haug et al., 2024).

7.2. Practical implications

The study findings offer valuable implications for practice. Developing an innovation strategy framework provides policymakers and managers with a practical tool for assessing and developing their digital innovation strategies in PSOs. The findings offer actionable guidance for policymakers, enabling them to design effective digital innovation strategies (see Cole, 2022; Kaur et al., 2022; Ramalingam and Prabhu, 2020). For instance, managers in PSOs can use these insights to identify the primary strategies (e.g., the focus of value creation and the strategic goal orientation) of digital innovation. This structured approach not

only facilitates the adoption of digital innovation, but also supports broader cultural transformation by shifting organizations away from rigid bureaucratic structures toward more agile and innovative work environments. Policymakers can use these insights to clarify innovation objectives and assess necessary capabilities to ensure that digital innovations align with both incremental and transformational goals. By integrating digital innovation into their strategies, PSOs can transition from rigid, bureaucratic cultures to becoming more responsive to citizens' needs, expectations, and challenges. Overall, these findings provide a valuable tool for assessing and refining digital innovation strategies, enabling policymakers to take informed decisions that enhance service delivery and create public value.

Our framework can also support PSOs in navigating between strategies, such as shifting from an anticipatory strategy to a persistent one, in response to an organization's needs, priorities, budget, and resources, as well as those of their clients. For instance, during a crisis or when organizations experiment with new digital technologies, they may seek to adopt a more exploratory approach. Once leaders recognize that a new digital approach is effective or beneficial, they may seek to integrate it more permanently into the organization, for instance by allocating resources, formalizing roles or responsibilities, or embedding it into existing workflows, thereby shifting toward a persistent innovation strategy. Public sector employees can similarly adjust their practices in response to shifting digital innovation strategies. These observations align with policy and practical documents (e.g., OECD, 2015, 2017) as well as other academic studies (Borins, 2001; Demircioglu and Audretsch, 2017; Lægrend et al., 2011) that have suggested that PSOs can change their structures, policies, and culture to become more innovative.

7.3. Limitations and future research directions

This study has two main limitations, which open opportunities for further research. First, our interviews primarily involved practitioners from developed countries in Europe, North America, Australia, and Asia, with limited representation from developing nations such as Kazakhstan and Brazil. Similarly, as the interviews were conducted only in English and German, we were unable to analyze more contexts. Future studies could investigate public sector innovation strategies in developing and non-English speaking regions, such as in Africa or South Asia, where strategies for digital transformation may differ significantly owing to unique national, local, organizational, and temporal contexts (see Cinar et al., 2019; Kaplinsky and Kraemer-Mbula, 2022; Vassallo et al., 2023). Analyzing different contexts in these areas may reveal critical influences of and differences between digital innovation strategies, including leadership roles and cultural differences.

Second, our analysis relied on self-reported data from CDOs. However, numerous other key roles contribute to digital innovation in the public sector, including CIOs, CTOs, heads of IT, and e-Government leaders. Similarly, many practitioners outside formal leadership positions—such as data scientists, software engineers, and digital project managers—bring specialized skills that drive digital innovation in their fields. Together, their contributions strongly shape digital innovation in the public sector (Guenduez and Mergel, 2022). Future research could expand on this by exploring the strategies of a broader range of practitioners, enabling comparative analyses of top-down and bottom-up approaches (see Arundel et al., 2019), as well as by examining how grassroots initiatives from non-leadership roles influence innovation efforts. Focusing on the interactions between these roles could reveal how collaborative dynamics shape strategic innovation outcomes.

7.4. Conclusion

Despite increasing research on digital innovations, there has been limited attention on the specific digital innovation strategies employed by PSOs. Based on interview data collected from 25 public agencies

across 18 countries, and analyzed using qualitative analysis and STM, we have identified four distinct digital innovation strategies: enhancement-oriented, anticipatory, adaptive, and persistent. The findings demonstrate that enhancement-oriented and persistent strategies are the most prevalent, and that PSOs integrate both incremental (e.g., process and service optimization) and transformational innovation strategies (e.g., structural and cultural change). This study adapts the OECD OPSI framework, which was originally developed for public sector innovation broadly, to the specific context of digital innovation. We also extend the framework by introducing persistent innovation as a distinct strategy, highlighting the importance of leadership, institutional anchoring, and long-term digital capability-building. By adopting different innovation strategies, PSOs can enhance their digital innovation efforts and can improve their capacity to address emerging challenges in the digital era.

CRediT authorship contribution statement

Ali Asker Guenduez: Visualization, Supervision, Project

Appendix A. The interviewees

Table A.1
List of the interviewees and their specifics.

CDO affiliation, city, country, and years of employment as CDO	
1	Antwerp, Belgium (since 2019)
2	Wellington, New Zealand (since 2020)
3	Nordhordland, Norway (since 2019)
4	Wellington, Australia (since 2018)
5	Rome, Italy (since 1998)
6	Hamilton, Canada (since 2019)
7	Moreton Bay, Australia (since 2015)
8	Westminster, UK (since 2020)
9	London, UK (since 2017)
10	Almaty, Kazakhstan (since 2019)
11	Stockholm, Sweden (since 2019)
12	Niteroi, Brazil (since 2021)
13	Belo Horizonte, Brazil (since 2017)
14	Rio de Janeiro, Brazil (since 2021)
15	Kaarina, Finland (since 2001)
16	The Hague, Netherlands (since 2016)
17	Tel Aviv, Israel (since 2016)
18	Paderborn, Germany (since 2017)
19	Bonn, Germany (since 2018)
20	Munich, Germany (since 2018)
21	Biel, Switzerland (since 2020)
22	St.Gallen, Switzerland (since 2017)
23	Paris, France (since 2016)
24	Boston, U.S. (since 2015)
25	Singapore, Singapore (since 2014)

Appendix B. Detailed results of the post hoc analysis

The STM results

The STM analysis provided deeper insights into the four digital innovation strategies we identified: enhancement-oriented, anticipatory, adaptive, and persistent innovation. By categorizing 23 topics generated through the STM process, we were able to assign each topic to one of these four strategies. The STM also allows one to analyze topic prevalence, which quantifies a topic’s significance, calculated based on the proportion of words in a document assigned to a topic (Roberts et al., 2019). Based on this, we calculated the prevalence of each topic and the strategy assigned to it. The results are shown in Table B.1. The analysis revealed new topics that show new aspects and dimensions in each digital innovation strategy. The STM results also confirmed our initial qualitative findings. Enhancement-oriented innovation (33.13 %) and persistent innovation (28.52 %) emerged as the most common strategies, followed by anticipatory innovation (22.86 %) and adaptive innovation (15.48 %), closely aligning with our manual coding results.

We will now outline the STM analysis’ key findings with a detailed discussion of how the post hoc analysis contributed to the main findings.

administration, Methodology, Formal analysis, Data curation, Conceptualization, Writing – review & editing, Writing – original draft. **Mehmet Akif Demircioglu**: Conceptualization, Writing – review & editing, Writing – original draft. **Elena Maria Mueller**: Formal analysis, Data curation, Writing – review & editing, Writing – original draft. **Emre Cinar**: Writing – review & editing, Writing – original draft.

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

In the preparation of this article, the authors used ChatGPT to improve the text’s fluency. We then carefully reviewed and copyedited the content as needed, and take full responsibility for the content.

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.

Table B.1

Identified topics, prevalences, and strategy assignments.

Topic	%	Five top words	Topic label	Reasoning for assignment
Enhancement-oriented innovation strategy (33.13 %)				
12	6.11	digit, innov, intern, need, pilot	Addressing internal needs through pilot digital projects.	Focuses on addressing internal needs by experimenting with digital solutions through small-scale pilot projects.
5	4.18	question, opportune, leverag, case, experi	Interrogating existing operations and leveraging opportunities.	Focuses on interrogating existing operations and leveraging digital opportunities to enhance them.
19	4.03	outcom, project, govern, peopl, director	Managing digital projects to improve service outcomes.	Focuses on managing digital projects with the goal of improving service delivery and performance.
9	3.9	simpli, process, technology, innov, societi	Streamlining administrative processes through digital tools.	Focuses on simplifying processes by reducing silos and eliminating media discontinuities.
18	3.81	traffic, light, smart, coordin, support	Improving urban traffic systems through smart technologies.	Focuses on improving existing traffic management systems through smart coordination.
3	3.78	solut, project, collabor, municip, vendor	Collaborating with external partners to digitalize local services.	Focuses on improving municipal services through digital solutions provided by external partners.
7	3.71	digit, innov, municip, problem, solut	Solving problems in city services through digitalization.	Focuses on digitalization to solve operational and service-related problems in local government.
15	3.61	digit, horizont, project, process, problem	Problem-based administrative process improvements.	Focuses on using digital tools to improve administrative processes.
Anticipatory innovation strategy (22.87 %)				
10	3.93	track, system, develop, univers, hospit	Future-oriented digital development in health and education.	Focuses on strategic projects to improve future-readiness in key public sectors such as healthcare and education.
13	3.86	sens, strategi, employe, peopl, long-term	Sensing needs to develop long-term digital strategies.	Focuses on identifying early signals and needs to inform the development of long-term digital strategies.
2	3.81	client, invest, busi, ecosystem, transform	Investing in future-oriented digital ecosystems.	Focuses on strategic investment in digital service ecosystems informed by client needs and aimed at future transformation in public service delivery.
8	3.77	smart, govern, peopl, citizen, data	Using data to become smart.	Focuses on using data to become smart (smart government, smart city, smart citizens, smart services).
6	3.76	know, digit, citi, data, mission	Informing strategic digital missions through citizen data.	Focuses on using data to understand citizens' needs and translating them into strategic digital missions for future service development.
20	3.73	digit, data, new, approach, technology	Exploring new technologies for future-readiness.	Proactively using data and technologies to anticipate and respond to future needs.
Adaptive innovation strategy (15.48 %)				
21	4.1	project, effici, custom, budget, politician	Adjusting digital innovation projects to budget constraints.	Focuses on adjusting digital innovation efforts to meet financial limitations.
1	3.93	people, need, work, service, hard	Adapting services to meet people's current needs.	Focuses on adapting digital services to meet people's needs and associated challenges.
4	3.74	know, digit, educ, school, materi	Responding to educational needs through digital tools.	Focuses on using digital tools to respond to evolving educational needs and expectations.
17	3.71	innov, service, model, digital, need	Adapting digital service models to social needs.	Focuses on modifying services models (also referred to as business models) in response to social needs through digital innovation.
Persistent innovation strategy (28.52 %)				
11	9.85	organ, people, consent, care, council	Building organizational commitment to digital innovation.	Focuses on building long-term commitment to digital innovation in PSOs.
16	7.12	staff, administr, cours, specialist, app	Building digital capacities in public administration.	Focuses on strengthening digital skills and capacities among administrative staff through training and specialization.
23	4.24	Cultur, leadership, workflow, hierarchi, speak	Transforming an organization's culture and structures to embed innovation.	Focuses on changing an organization's culture and structures—such as leadership, collaboration, workflows, and hierarchies—to embed innovation in everyday practices.
14	3.72	organ, work, allow, regul, deal	Creating formal conditions for persistent digital innovation.	Focuses on shaping organizational regulations for work processes to support and institutionalize ongoing digital innovation.
22	3.59	people, public, govern, interest, agenc	Persistent alignment of digital innovation with the public interest.	Focuses on maintaining a long-term alignment between digital innovation efforts and the public interest in government agencies.

5.2.1 Topics related to enhancement-oriented innovation

Topics we identified through the STM analysis grouped to the enhancement-oriented innovation focus on improving internal processes, external collaboration, and service quality through digital transformation. Topic 12 reflects the enhancement-oriented strategy of addressing internal needs through pilot digital projects, focusing on meeting internal organizational demands by experimenting with digital solutions in small-scale practical initiatives. This is supported by terms such as 'digit,' 'innov,' 'intern,' 'need,' and 'pilot.' Topic 7 emphasized the importance of problem-centered digital innovation in municipal services, with terms such as 'innov,' 'municip,' 'problem,' and 'solut.' Topic 5 pointed out the roles of public feedback, as terms such as 'leverage,' 'feedback,' 'experience,' and 'resident' showed how practitioners use citizens' inputs to refine and enhance services. The collaborative efforts between the public sector and external actors ('municipality,' 'sector,' 'vendor,' and 'collaboration') were reflected in Topic 3, ensuring that digital innovation projects are effectively executed. Finally, Topic 19 underscored governance's roles in improving public service and focusing on outcomes, with terms such as 'outcome,' 'govern,' 'head,' 'people,' and 'act.'

5.2.2 Topics related to anticipatory innovation

Anticipatory innovation prepares PSOs for future technological and societal shifts through strategic foresight and proactive implementation. Topic 13 underscored the sensing of internal and external needs of employees and citizens as well as the importance of setting long-term goals, with terms such as 'sense,' 'need,' 'strategy,' and 'employee.' Similarly, Topic 6 focused on using data and digital platforms to gain insights into citizens' needs and identifying future demands ('know,' 'data,' 'city,' and 'mission'). That PSOs actively plan and invest in the future was showcased in Topic 2, with top words such as 'course,' 'realisation,' and 'invest.' Similarly, Topic 8 emphasized objectives of becoming smart using data in different domains such as city, government, services, citizens, and IoT ('smart,' 'govern,' 'thing,' and 'city'). Topic 10 ('track,' 'system,' and 'develop') and Topic 20 ('digit,' 'data,' 'new,' 'approach,' and 'technology') focused on future-readiness through strategic data use projects in sectors such as healthcare and education. Together, these topics revealed a focus on long-term planning and proactive anticipation of future needs.

5.2.3 Topics related to adaptive innovation

Adaptive innovation in the public sector is driven by the need to respond to societal demands and changing conditions. Topic 1 highlighted efforts and work to digitize services to meet people's needs, with terms such as 'need,' 'people,' 'digital,' and 'work' emphasizing the adaptation of processes and service delivery. Topic 4 illustrated flexibility in adapting digital tools in education and municipal services, with terms such as 'digital,' 'education,' 'school,' 'city,' and 'project' underscoring efforts to address sector-specific needs. Topic 17 emphasized how PSOs adjust their service models to respond to social challenges, with top words such as 'innov,' 'service,' 'model,' 'digital,' and 'need.' Finally, Topic 21 emphasized the pursuit of efficient public projects that navigate budget and political pressures. This approach reflects the adaptation of services to align with both citizens' needs and practical constraints, ensuring that public sector offerings remain both responsive and feasible.

5.2.4 Topics related to persistent innovation

Persistent innovation focuses on embedding long-term digital transformation into the fabric of PSOs. Topic 11 emphasized fostering collaboration and alignment across teams, with top words such as 'council,' 'organization,' 'rule,' and 'consent' underscoring leadership's roles in ensuring sustained innovation. Capacity-building efforts were highlighted in Topic 16, with terms such as 'department,' 'staff,' and 'specialist' reflecting a focus on developing internal skills and organizational support for ongoing innovation. Topic 22 took a more external view by focusing on aligning digital innovation goals with the public interest ('connect,' 'govern,' 'public,' and 'people'), ensuring that digital transformation is widely accepted across governance levels. Finally, Topic 23 emphasized leadership and cultural change ('culture,' 'leadership,' and 'workflow'), ensuring that digital transformation is integrated into daily workflows and hierarchies for long-term success.

Data availability

Data will be made available on request.

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