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Support Factors and Mechanisms for Civil Servants' Digitalization Readiness

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Abstract

This study investigates organizational support factors and mechanisms that enable civil servants' digitalization readiness in municipal technical services. We define civil servants' digitalization readiness as an individual's ability and preparedness to utilize devices, software, digital materials, and remote work in their public organization duties. Despite increasing digitalization in public administration, there is limited understanding of how civil servants experience and perceive organizational support in the digitalization context, particularly in the technical sector, where digital transformation significantly impacts service delivery. Empirical data was collected through individual thematic interviews with civil servants in land use planning and construction supervision in 11 Finnish municipalities. We identified two mechanisms enabling civil servants' digitalization readiness: (1) organizational resource mechanism, where socio-technical resources (e.g., infrastructure, peer support, IT support, and data management) affect work capabilities, and (2) creative digital tension mechanism, which activates through drivers including peer examples, skills assessments, state legislation, and perceptions of usefulness. Creative digital tension emerges as civil servants recognize gaps between current and desired capabilities, motivating learning and utilization of technologies. Our primary contribution to public administration literature is developing a conceptual framework for understanding organizational support mechanisms for civil servant digitalization readiness in municipal service production digital transformation.

Keywords:
digitalization readiness;
civil servants;
support;
technical sector;
municipality

Practical Relevance

- Seven main socio-technical factors support civil servants' digitalization readiness in municipal organizations: (1) available and functional software, (2) fair and tailored work-related training, (3) high-quality, interoperable, and secure digital data management, (4) quick and low-barrier IT support, (5) empowering leadership from funded practical strategy toward digitalization, (6) facilitated peer support, and (7) flexible remote work opportunities.
- Civil servants' digitalization readiness is a systemic, complex, and context-dependent phenomenon based on individual, organizational, and external factors.
- The findings suggest that while perfect technological conditions aren't necessary, municipality organizations must ensure minimum organizational support prerequisites for civil servants' digitalization readiness to materialize.

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Introduction

There is increasing pressure on public administration to deliver more cost-efficient and effective services using digital solutions, materials, and hybrid work (Mergel et al., 2019, 2023). Digitalization has been a response to rising citizen expectations, financial constraints, and the necessity for more responsive governance (Plesner et al., 2018). Digitalization in public services involves adopting technologies and reshaping service delivery to meet evolving societal needs (Lindgren et al., 2019). On the other hand, researchers have emphasized that while productivity is a significant driver, the main objective of digitalization in public administration should be to enhance public value creation (Pang et al., 2014). In this study, we define digitalization as the utilization of devices, software, digital materials, and remote work in a public organization's internal and external operations (Kristensen, 2023; Lindgren et al., 2019; Plesner et al., 2018).

Despite the potential benefits, digitalization also presents challenges in public sector service production. It brings continuous systemic change at the individual, team, and organizational levels (Haug et al., 2023; Mergel et al., 2019). These changes (digital transformation) are related to tools, materials, practices, processes, social relationships, learning, organizational culture, and end products and services (Verhoef et al., 2021). The changes brought about by digitalization do not always appear positive, and organizations struggle with practical implementation (Moser-Plautz & Schmidthuber, 2023; Parviainen et al., 2017). Furthermore, the targeted positive impacts have not always been achieved (Gebauer et al., 2020).

Digitalization may also bring negative consequences to civil servants, including an increase in work-related stress, extended availability, and workload, as well as the fragmentation of tasks (Mergel et al., 2019; Plesner et al., 2018; Pollitt & Bouckaert, 2004). In addition, studies have found that support for civil servants in developing digital competencies is lacking (Bannykh & Kostina, 2021; Manana & Mawela, 2022). Therefore, more information and knowledge are needed about the support for civil servants' digitalization readiness, which we define as an individual's ability and preparedness to utilize devices, software, digital materials, and remote work in their public organization duties (Deja et al., 2021; Konttila et al., 2019; Trenerry et al., 2021).

In this study, we consider civil servants' digitalization readiness to include individual attributes such as digital skills and attitudes supported by organizational and external factors. We define support in the digitalization context as the perception civil servants have of the support they receive or wish to receive – from within the municipal organization or from external actors like software vendors – in utilizing digital solutions, materials, and remote work (applying Kurtessis et al., 2017). Civil servants' digitalization readiness is an essential topic for the public sector because the success of digital initiatives in public service production largely depends on the ability of its workforce to utilize and leverage technologies (Haug et al., 2023; Manfrini et al., 2024; Weerakkody & Reddick, 2012).

While public administration research has examined various aspects of digitalization, including civil servants' technology adoption (e.g. Mergel et al., 2019; Plesner et al., 2018), implementation of digital services (e.g. Cordella & Tempini, 2015; Lindgren et al., 2019), organizational capacity for digital transformation (e.g. Gasco-Hernandez et al., 2022; Meijer & Bolívar, 2016), the interaction between individuals and technological solutions (e.g., Andersson et al., 2022; Gram, 2024) and the implementation and impacts of specific technological solutions (e.g., Gullberg & Svensson, 2020) - there remains a research gap in understanding how organizational support factors and mechanisms enable digitalization readiness in public organizations. Specifically, while existing research has identified various factors affecting digitalization, there is a lack of empirical evidence of how these factors operate together through organizational mechanisms (Bhaskar, 2008) to support civil servants in their digital transformation efforts. This study addresses this gap by examining how civil servants experience and utilize organizational support in their work duties, particularly in municipal technical services where digital transformation significantly impacts service delivery. This understanding is particularly relevant for public management research, as organizational support mechanisms in public organizations operate under distinct conditions of statutory requirements, political oversight, and public accountability (Haug et al., 2023; Mergel et al., 2019).

Our study contributes to public administration literature by examining civil servants' digitalization readiness support factors and mechanisms in municipality organizations. Our main research question is: What socio-technical factors and underlying mechanisms support civil servants' digitalization readiness? Through interviews, we will answer this in more detail: In what matters, from whom, and what kind of support do civil servants perceive to receive or would like to receive in digitalization? This study takes a practice-oriented approach, examining how civil servants experience and navigate digitalization challenges in their daily work. While recognizing the broader implications of public sector digitalization, we aim to understand how municipality organizations can enable civil servants' digital capabilities.

We chose the Finnish municipal technical sector for the context of this study. Finnish public organizations are at the forefront of digitalization development, as measured by many indicators (European Commission, 2023b, 2023a). In the municipal technical sector, mandatory digital transformation requirements and intensive use of specialized tools and digital materials in service delivery (Jussila et al., 2016; Nummi et al., 2022) create distinct conditions for studying civil servants' digitalization readiness. The technical sector's statutory responsibilities and complex service delivery requirements provide a particularly relevant context for examining organizational support factors and mechanisms in digital transformation. Research on digitalization in public service production sectors has primarily focused on education, healthcare, and social services contexts (e.g. Kaihlanen et al., 2022; Levy et al., 2019). The technical sector has received limited research attention despite its essential role in municipal service delivery through urban planning, construction supervision, environmental protection, and infrastructure management.

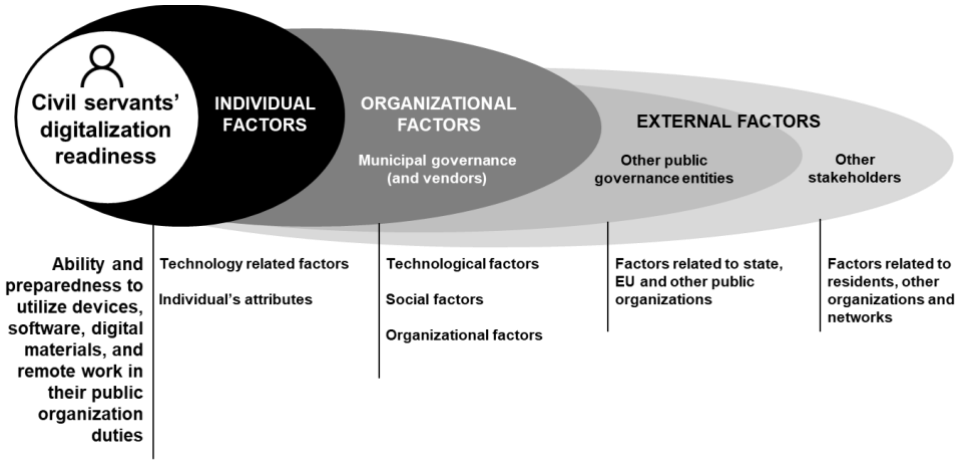
Theoretical Framework

Civil servants' digitalization readiness

The definitions of digitalization and digital transformation are not well-established in administrative research (Haug et al., 2023; Mergel et al., 2019). There is also no widely used definition for digitalization readiness (Muehlburger et al., 2022; Voß & Pawlowski, 2019). Digitalization readiness has also been studied through terms such as digital readiness, e-readiness, digital transformation readiness, digital preparedness, technological readiness, innovation readiness, digital maturity, and agility (García-Mireles et al., 2012; Trenerry et al., 2021; Vial, 2019). Previous organizational research has predominantly focused on the organizational-level factors of digitalization readiness (Bumann & Peter, 2019; Cetindamar & Abedin, 2021; Hausberg et al., 2019). Employee perspective has received less attention (Abdul Hamid, 2022; Voß & Pawlowski, 2019). In addition, research has mainly been conducted in the private sector settings (Maghrifani et al., 2022; Meske & Junglas, 2021; Saputra et al., 2023).

Based on previous research, we conclude that civil servants' digitalization readiness is composed of interconnected context-dependent individual and organizational factors, which are influenced by external factors outside the organizations, see Figure 1.

Figure 1. Civil servants' digitalization readiness factors in municipal organizations (applying Deja et al., 2021; Gfrerer et al., 2021; Kristensen, 2023; Nguyen & Broekhuizen, 2022; Trenerry et al., 2021; Venkatesh et al., 2003)



Individual-level factors include technical and dynamic skills, the experience of usefulness and ease in utilizing technologies, attitudes, and confidence in using technologies. At the organizational level, relevant factors include the available technology infrastructure and data management, technical IT support, peer support, and a technology-friendly organizational culture. (Cetindamar & Abedin, 2021; Kristensen, 2023; Trenerry et al., 2021.) For example, the functionality and usability of available tools significantly affect individual readiness, and poorly functioning or complex systems can create barriers to adoption and effective use. In municipalities, factors external to the organization, such as mandatory legislation, software vendors, civil servants in other municipalities, and citizens, influence civil servants' digitalization readiness (David et al., 2023; Meijer & Bolívar, 2016). For instance, Finnish legislation requiring municipalities to deliver zoning maps in data model formats drives the need for new digital competencies among civil servants.

The study of readiness is particularly relevant in the context of continuous digital change in public administration, as readiness indicates both current capabilities and future potential (Gfrerer et al., 2021) for development. This potential can be seen as the intention to use technologies (Venkatesh et al., 2003). However, while digitalization readiness may enable new service delivery approaches, the relationship between digitalization readiness, service quality, and public value creation is complex and context-dependent. Research suggests that while civil servants' digital capabilities may sometimes improve service delivery (Afrizal et al., 2024; Andersson et al., 2022), digital solutions can also create barriers for citizens or reduce service quality. Therefore, digitalization readiness should be understood as the ability to use digital tools and the capacity to critically evaluate when and how digital solutions can genuinely enhance public service delivery.

Digitalization readiness from public sector organization perspective

Management and leadership roles have been identified as central to successful digital transformation in public organizations (Nuryadin et al., 2023; Ushaka Adie et al., 2024; Yusuf et al., 2023). Managers at different organizational levels should foster employee autonomy and empowerment, particularly in technology choices and professional development opportunities. These managerial practices can enhance employee job satisfaction, productivity, and attitudes toward digital transformation. (Abhari & Solomon, 2020; Heim & Sardar-Drenda, 2021; Maghrifani et al., 2022; Meske & Junglas, 2021.) In remote work contexts specifically, managerial trust, emotional support, and leading by example have emerged as crucial factors for successful implementation (Pensar, 2023). Senior management and HR should create an organizational culture that is positive toward digital transformation, encourages experimentation

and innovation, provides resources and is fair, and defines digital goals in its strategy (Çetin Gürkan & Çiftci, 2020; Dhar, 2012; Trenerry et al., 2021).

In the public sector, the organization must provide the necessary technological infrastructure, including devices, software, effective data management, continuous training, a digital-friendly working environment, and the ability to work in teams. Challenges have been identified regarding the usability of existing technological solutions, creating an innovative and experimental climate in the public sector context, and the different teams' attitudes toward digital transformation and its promotion. (Edelmann et al., 2023; Kristensen, 2023.)

In the municipal context, support has been seen as reducing or removing barriers to digital transformation, particularly concerning digital assets (Lafioune et al., 2023). This has been seen as necessary in the context of municipalities, which are fragmented along sectoral lines. Especially the interoperability of digital assets has been seen as a challenge in municipalities (Bousdekis & Kardaras, 2020). The role of IT is central to the interoperability of technological infrastructure and data sets (Lafioune et al., 2023). The municipal political trust should also play a role, as political support can facilitate resource allocation, prioritize digital initiatives, and legitimize changes required for digital transformation (Kristensen, 2023).

Previous studies have noticed that many public sector-specific aspects hinder the promotion of digitalization in public administration service production. These include regulatory and legislative constraints requiring strict compliance, complex political decision-making processes needing multiple approvals, organizational cultures with long-standing work routines, fragmented service production across sectors complicating integrated solutions, and heightened public accountability requirements demanding greater transparency. (Giest & Raaphorst, 2018; Nair et al., 2024; Syuhaini & Berényi, 2022.)

Theoretical lens

We integrate three complementary theoretical perspectives to examine how support factors and mechanisms enable civil servants' digitalization readiness. Firstly, the organizational support theory (Kurtessis et al., 2017; Rhoades & Eisenberger, 2002; Shanock & Eisenberger, 2006) helps understand how civil servants experience and interpret organizational support. Secondly, the unified theory of acceptance and use of technology (Venkatesh et al., 2003) helps to explain individual adoption behaviors and attitudes. Thirdly, the organizational learning perspective (Senge, 2006) illustrates how municipality organizations develop collective digital capabilities through individual, team, and organizational learning and shared understanding. From an organizational learning perspective, we apply Senge's (2006, 139-144) concept of creative tension, which describes how the gap between vision and current reality generates energy for change and learning. We adapt this concept as creative digital tension in the context of digitalization readiness, defining it as the productive tension that emerges when civil servants recognize gaps between their current situation and their desired state. This tension manifests in two primary ways: gaps in individual capabilities (between current and required competencies) and gaps in organizational prerequisites (between available and needed digital tools and support structures). These tensions can emerge through perceived learning needs, inadequate technological infrastructure, or recognition that new technologies and support structures could enhance work practices.

These three theoretical perspectives help analyze how civil servants' digitalization readiness emerges through individual experiences, organizational support factors, and broader institutional influences in municipal technical services. The framework enables the interpretation of empirical data and explains mechanisms through which organizational support enables civil servants' digitalization readiness.

In this study, we understand organizational mechanisms as underlying causal or connection patterns that explain how support factors lead or can lead to specific outcomes in specific contexts (Bhaskar, 2008). Mechanisms operate deeper than observable events, helping us understand how support factors enable civil servants' digitalization readiness (applying Bhaskar, 2008). For example, when an organization provides IT training (a support factor), the underlying mechanism might operate by creating awareness of the gap between current and desired capabilities, which generates motivation for digital learning and change (Edelmann et al., 2023;

Oberländer et al., 2020; Senge, 2006). Context-dependent organizational mechanisms can also interact by reinforcing or suppressing effects with each other, potentially strengthening impacts, reducing effects, or creating new potentials (Mountasser & Abdellatif, 2023; Watson et al., 2024).

Design and Methods

Context: Land use planning and construction supervision in Finnish municipalities

Finland has 308 municipalities, each maintaining its own technical services sector with distinct structures and resources. Technical services like land use planning and construction supervision significantly impact residents' and stakeholders' daily lives, safety, and well-being. Municipal technical services include land use planning (primarily zoning), construction supervision (mainly building supervision and building permits from citizens and organizations), environmental protection, construction of roads and other infrastructure, and water and waste management. The technical sector produces essential public services for society and exercises significant public authority, for example, by processing construction permits. Through zoning maps and guides, land use planning decides where residential areas and roads are located, what kind of homes are built, and where wind power is developed. Construction supervision is responsible for the safety and health of residential and industrial buildings. (Land Use and Building Act, 132/1999.)

Municipal land use planning is carried out through master, detailed, and shore-detailed plans. The master plan outlines the main land-use development directions, determining where residential areas, workplaces, and roads will be located. The detailed plan specifies land use and construction guidelines, considering local conditions, urban aesthetics, and agreed-upon objectives. These planning processes often span several years and involve numerous stakeholders. The tasks of the municipal construction supervision authority include compliance with plans, processing construction permits, and supervising the maintenance and care of the built environment. Job titles in the technical sector include planner, planning engineer, geographic information system engineer, building inspector, permit secretary, and technical manager. In municipal contexts, we refer to 'civil servants' as all employees in the municipal organization who participate in the service production of land use planning and construction supervision, regardless of whether they have official responsibility. Municipalities in Finland hold a monopoly position in land use planning and construction supervision, as these are statutory tasks. While some services, like the production of zoning plans, can be outsourced to consultants, certain responsibilities (such as approving zoning plans by municipal councils) must be carried out internally. (Land Use and Building Act, 132/1999.)

Digitalization has advanced in many ways in Finnish municipalities' land use planning and construction supervision processes (Jussila et al., 2016; Nummi et al., 2022). For instance, municipalities are implementing GIS-based planning tools, digital permit processing systems, and digital platforms for public engagement, which require civil servants to learn new technological competencies. In Finnish municipalities, productivity gains through digitalization have also been achieved with improved service quality and coverage without necessarily escalating costs (Jussila et al., 2016). Digitalization in the technical sector is topical because mandatory legislation has recently promoted digitalization (e.g., Act on the Built Environment Information System, 431/2023). Finland will move to a more technologically advanced information model format for preparing and submitting data nationally in land use planning and building permits by 2029. Technological developments and the aim of increasing productivity in the sector have contributed to digitalization in municipalities' technical sector service production. There is a desire to promote digitalization in national and regional public administrations.

Data and analysis

As we aim to increase understanding of the relatively unexplored topic of municipality civil servants' support in the digitalization context, we chose a qualitative approach. The empirical

data for our study was collected by interviewing Finnish municipality civil servants in the technical sectors' land use planning and construction supervision. We targeted civil servants in expert or planning roles. We aimed to get interviewees from municipalities representing different geographical areas of Finland and municipalities of various population sizes because Finland's 308 municipalities vary significantly in population size. This variation is analytically relevant as population size is linked with municipal organization size, resources, and support structures. Previous research has shown that larger organization size generally positively influences technological innovation adoption through greater resource availability and economies of scale, though it may also introduce implementation complexities (David et al., 2023; Kristensen, 2023). This size-based variation allowed us to examine how support factors and mechanisms operate under different municipal conditions.

Interview invitations were e-mailed to 35 individuals in mainland Finland between 19.1.2024 and 19.2.2024. We interviewed all those who agreed to be interviewed. In data gathering, we adhered to the research ethics and data privacy (Bhattacherjee, 2012, 137–142). We obtained written consent for interviews from the interviewees and their municipal organizations. The consent accompanied the research announcement describing the background, objectives, methods, data processing, and the interviewee's rights.

We used the semi-structured interview method (Kvale & Brinkmann, 2009). We created the main themes for the interview from our theoretical framework: the participant's job description; the equipment, software, and digital materials they use in their work; remote work; the support they perceive to receive concerning digitalization; the organization's work culture and atmosphere around digitalization; digital innovations; professional development; job satisfaction; and employee digitalization readiness.

A total of 11 online interviews were conducted in February 2024, all from different municipalities. The municipalities represented ten provinces from all over Finland – north to south. The population categories for the municipalities were under 4,000 (one interview), 4,001–10,000 (two interviews), 10,001–50,000 (four interviews), 50,001–100,000 (one interview), and over 100,000 (three interviews). The participants' job titles included architectural planner, general planner, inspection engineer, land use planner, and licensing clerk. The average duration of the interviews was 67 minutes, and the total duration was about 12 hours. The total transcribed words in the data were about 85,000 (approximately 252 pages). Data saturation began to emerge (Guest et al., 2006) around eight interviews, as new interviews primarily reinforced our understanding of support rather than revealing new insights. We continued interviews with eleven participants to add to our understanding of different municipal contexts.

We analyzed the interview data using thematic analysis (Braun & Clarke, 2006). ATLAS.ti 24 software was used for data management, but researchers manually conducted coding and category development. The analysis was conducted in stages. We read the transcriptions several times during the analysis to ensure deep familiarity with the data. We set aside the pre-existing interview themes and identified meaningful expressions related to our research question on socio-technical support factors. This process yielded 91 initial codes. We grouped these initial codes into preliminary categories based on their similarities. This process was somewhat iterative, constantly comparing codes and emerging categories. Further analysis refined these preliminary categories into seven main categories (i.e., support factors). This refinement involved merging similar categories, splitting broad categories, and ensuring each main category was distinct and coherent. After establishing the seven main support factor categories, we engaged in a more interpretive analysis to identify underlying mechanisms. This involved examining relationships between categories, considering how they interacted, and looking for patterns that could explain how these support factors operated in practice. We ultimately identified two main underlying mechanisms that encompassed and explained some relationships between the seven support factors and civil servants' digitalization readiness. This final step involved moving from a descriptive to a more explanatory level of analysis grounded in our theoretical framework, theorizing the underlying mechanisms that could explain enabling conditions for civil servants' digitalization readiness. Through this theorization, we aimed to add knowledge about how support mechanisms operate in a municipal context.

Limitations

This study aims not to produce generalizable knowledge but to describe and understand support factors and mechanisms that enable civil servants' digitalization readiness in municipal organizations. This research data and analysis method produces a preliminary understanding of organizational support in the digitalization context, which can be deepened in future studies using different methodological approaches such as longitudinal studies, discourse analysis, or mixed methods research. Because we use a qualitative approach and interviewed relatively few people (11 civil servants from 11 municipalities in one country), more research is needed to validate our findings in other than municipality technical sector contexts and other countries. The findings are based on the subjective perceived opinion of the civil servants, so more data points are needed in future studies to get a better holistic view. The study relies solely on semi-structured interviews for data collection. While this method is valuable for in-depth exploration, incorporating additional data sources would strengthen the findings. The results may be influenced by the fact that most interviewees had a positive attitude toward digitalization and good IT skills. We interviewed civil servants from both land use planning and construction supervision, and the views of these two specialist groups were similar. Quantitative research could come into question to obtain more reliable and generalizable results. We couldn't focus on specific factors or underlying mechanisms because we aimed for a holistic view. As a result, our conclusions remain at a descriptive level.

Findings

First, we present an overview of our findings on civil servants' digitalization readiness and the support they perceive to receive. Then, we detail our seven main support categories (i.e., factors) from the interview data. We start with more technologically oriented categories and proceed to categories with more social components. The last section presents our findings and conclusions on the underlying mechanisms enabling civil servants' digitalization readiness.

Overview

Civil servants primarily perceived support regarding technical IT assistance, training opportunities, and peer support from municipal colleagues. In most cases, civil servants received good, fair, and inclusive socio-technical support for accessing and using hardware, software, digital materials, and remote work in their duties. Support for digital and substantive work was seen as intertwined because the technical sector specialist work in municipalities in Finland is carried out mainly with devices, software, and digital materials: "Without digital systems, getting any work done would be impossible" (P4). The participants also saw that employer organization has a decisive role in civil servants' digitalization readiness:

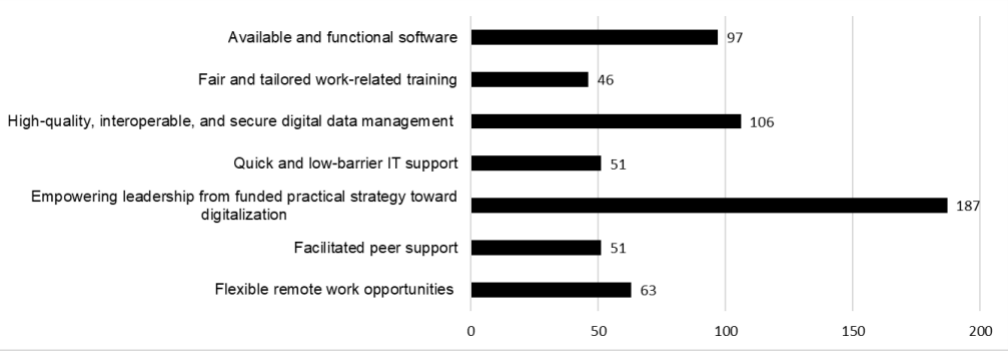
> The employer must provide support. It can't just be left up to the civil servant to learn; the employer must organize training and support. This support significantly affects how quickly work can be done. It's also in the employer's interest that [we] use all the programs proficiently (P6).

Digitalization readiness was seen as a vital part of specialist work: "[Digital] readiness is an essential part of today's work. We don't have a role in which one could function without it" (P4). Municipality organizations' and civil servants' digitalization readiness is needed in internal and external operations. For example, civil servants highlighted examples such as following council meetings through the municipality's website, publishing decision documents in digital format, and visibility on social media. In construction supervision, customer service has mostly moved online, and customers make contact mainly through digital permit systems or email. Municipalities' processes and capabilities have been lagging behind the readiness of the residents and the private sector. For example, residents' and companies' architectural or construction drawing materials have been digital for a long time. In the public administration context, legislation has a direct influence on civil servants and municipal digitalization readiness: "It is found in some law that there must be the capability to receive files in the [digital] format" (P2).

Descriptive results: Support factors for civil servants' digitalization readiness

From the interview data, we identified seven main intertwined support factors for civil servants' digitalization readiness in municipalities (Table 1). We will present our findings in detail in the following chapters.

Table 1. Categories and number of coded quotations in the interview data



Available and functional software

Civil servants can influence to some degree what software is used in their work duties, as those responsible for software purchases (for example, the IT department) trust the employees' opinions of necessity and suitability. Municipality specialists who felt they could influence these conditions were also very satisfied with their working conditions. However, there is no opportunity to influence software used across the municipality, such as case management software:

> We can have a say in those directly related to our work. Very few people here do these jobs and know what we do. As a small team, we can map it out (P7).

> We have the attitude that everyone should have the [tools] needed for work (P10).

Land use experts were more critical of the programs than construction supervision civil servants. A common complaint was that software vendors focused on building more features before the basic usability features were in order: "If you need to read the instructions, you have poorly made software. The interfaces should be more self-explanatory" (P3). Employees felt they had to use too many different software in their work. As a result, several municipalities adopted technical sector-specific systems that combine multiple software packages to enhance work efficiency, as illustrated by the following quote: "We hope that this spatial data reform will compile our current data. It could help eliminate some systems" (P7).

Civil servants felt that verbal encouragement inside the organization was important regarding encouragement and incentives concerning software and digital innovation processes. Some employees have received awards from software vendors for outside encouragement and incentives for developing the software with them.

Municipalities are interested in open-source software because it is often flexible and free of charge for municipal organizations. National resources are hoped for open-source software development and user support, even though competition legislation may hinder this.

Fair and tailored work-related training

Civil servants' training needs differ, but the need for continuous training emerged in most of the interviews. For example, industry-specific software is constantly developing due to changes in legislation. In addition, some employees had difficulties in managing some of the software. They saw that it affected the quality of their work. In most municipalities, employees can attend industry-specific software training remotely or face-to-face by an external party (such as software vendors). Information about suitable training is shared among team members on their intranet:

> It is seen that if people are interested in training in specific areas of work, that is supported. It is viewed that this will also be helpful to others (P3).

The situation regarding training is not good in all municipalities: "You can get [training] from software vendors with money. In a way, it's the best, but usually, there isn't much money allocated for that" (P5). Budgetary constraints, constant rush in work duties, the need for highly specialized training due to civil liability, and forced self-direction were mentioned as challenges. Civil servants stated that due to the municipality's tight financial situation, the training budget per person could be a few hundred euros annually. Training is not available equally in all municipalities, and even within the same sector, different departments may have different budgets per person. Getting training requires self-direction: "No one comes to offer [training]; we must figure it out ourselves" (P7).

The benefit for job duties was seen as the most essential factor in seeking new IT skills. Most civil servants expressed that training should be mainly related to actual work and software deployment, not generic IT skills. Many specialists are interested in developing artificial intelligence skills, but only if these skills are directly related to their job duties.

High-quality, interoperable, and secure digital data management

Digital documents and materials are essential in getting benefits from digitalization: "Applications are only as good as the source data, the initial material" (P4). Public administration produces a lot of documents that also need to be archived for legal purposes. Civil servants expressed that, in large part, digital materials also enable remote work. Most work-related materials are in digital format, but not all are. Some, like zoning maps, earlier construction permits, and background materials for municipal councils, are in paper format: "Our planning requirement decisions are still only in paper form" (P9).

Because some of the materials are still in paper form, civil servants would like to have at least official documents in digital format. These materials should also include historical data so the specialists can make more informed decisions. One main concern was that digital materials do not accurately reflect the real world, so resources and processes should be allocated to keep data current. Security concerns were also raised concerning public digital data access. The digitizing of materials has often taken years, typically starting with digitizing paper archives, followed by interoperable metadata where different systems or organizations can share, use, and understand the same data seamlessly.

> The official had zoning maps hidden in the cabinet, and if they happened to be on vacation or in a bad mood, you couldn't get those zoning maps, which are precisely the basis of all construction... The same plans are made multiple times because the old ones can't be found (P1).

Interoperable data was seen as vital because the municipality service production is fragmented along sectoral lines. The following quote highlights the need for interoperability:

> Building interfaces between different programs is time-consuming and expensive, but there should be more of them. Data must still be stored in many places and manually processed in many different systems (P2).

Quick and low-barrier IT support

General IT support is provided mainly by outsourced vendors, but some civil servants receive this in-house. Most employees were satisfied with the general technical support they received. Support can be reached in many ways: by phone, email, online chat, and on-site. The most common complaint was that they had to wait a day or more for general IT support: "It can be a bit slow at times. You might have to wait a day" (P5).

In larger municipalities, as measured by population size, more financial resources are also available for IT support, but obtaining support can be slower. Civil servants felt that general technical support should be more inclusive to different demographics and technological skill levels:

> If you are a young, beautiful woman, you get support no matter what, but when you're an older man, nobody is interested in advising or helping at all (P1).

> I believe that [support] can be [different for different individuals]. Of course, there's the matter of the knowledge level of the person seeking help (P3).

Empowering leadership from funded practical strategy toward digitalization

The topic of leadership (including municipal trust, senior management, HR, IT, and technical sector managers) was the most common theme in the interviews. Leadership was intertwined in many socio-technical support areas. Civil servants felt that managers should act as promoters of digitalization within the municipality (working conditions and digitization of services), leading from the front line and ensuring the digital competencies of all specialists:

> Fortunately, among our leaders, we have had technical directors who have seen this development... In that sense, the foundation was already laid 20 years ago, and we can now continue with all of this (P2).

> [If the employee doesn't have digital skills], it's a failed recruitment for our organization. I've told our interviewing supervisors to ensure potential employers can use smartphones (P3).

Management also has a central role concerning encouragement and incentives. Interviewees had received verbal encouragement and monetary incentives for digital innovations and felt that access to inter-municipal state-funded projects that promote digitalization is also encouraging.

Leadership and municipality governance were considered necessary regarding work culture, processes, resource allocation, and remote work practices. Civil servants would primarily fund the digitization of work-related materials, like zoning maps and construction supervision decision documents. The challenges employees face related to digitalization significantly complicate official duties and other work and may not necessarily be visible at the municipality's senior management level. The municipality's decision-makers were expected to take a strategic approach to digitalization. In some municipalities, strategy papers were also put to work:

> It seems that the strategy is not just rhetoric but genuinely a direction that we want to maintain... to make it easier for the customer to use our service, to facilitate access to information, or to make the work of the civil servants more efficient (P3).

Some municipality trusts still want paper documents to support decision-making: “A small part of [municipality trust] tries to maintain the paper world” (P4).

Facilitated peer support

Peer support was perceived to be vital because job duties in the municipality technical sector demand a high level of expertise, so only a few colleagues can help with substantive digitalization problems. Even in large cities, there are relatively few close co-workers. In municipalities with smaller populations, the organizational hierarchy is low, so there are more opportunities for peer support between service production sectors.

Peer support was discussed in two contexts: giving (e.g., regarding new software features) and receiving (e.g., low-barrier meetings). Inter-departmental cooperation and support related to digitalization was generally scarce. Still, most of the experiences of peer support were positive. In practice, peer support was one-to-one ad hoc help from colleagues, an internal shared online knowledge base of best practices, organized mentoring, and internal support day events. Peer support from colleagues in industry-specific software was especially appreciated.

> There's a big difference in how programs can be used. I try to find the best practices and share that information (P1).

Organizations have an important role in facilitating peer support because, from the learning organization theory perspective, structures create organizational actions (Senge, 2006, 40). Facilitating can be done, for example, by encouraging knowledge sharing and creating online forum practices and processes.

Peer support was also given and received by colleagues outside their municipality organization. This peer support was often in industry-specific software users’ online forums. However, there was only some peer support between municipalities. This lack of cooperation was considered strange, especially in cases where the same software was used. Public administration characteristics like long-standing unchanged practices were seen as reasons for this:

> [Inter-municipal] dialogue seems very sensitive and cautious. I don't know if it's related to the old-fashioned bureaucratic style of handling things. There's a fear of putting oneself and one's actions on the line to seek advice and comparison (P2).
>
> Municipalities with the same systems could visit to get acquainted. We could see what the neighboring municipality is doing with that program… Someone might have a good practice we haven't realized (P5).

Flexible remote work opportunities

Utilizing remote work was an important socio-technical support factor in civil servants' digitalization readiness. Social aspects in hybrid work settings were perceived to be important: "I live a kilometer away from work, so I prefer to come here to see friends" (P5). The connection with perceived socio-technical organizational support was also evident in reverse situations, where civil servants didn't perceive organizational support in remote work: "It significantly lowers my job satisfaction [not being allowed to work remotely]" (P9). Most interviewees work remotely on some days of the week. Remote work has increased productivity, job satisfaction, and physical well-being but decreased social interactions.

> I would work 100 percent remotely if it were possible (P9).
>
> We got over the coronavirus and found that this [remote work] model works quite well. It may even enhance work efficiency and act as a motivator for employees (P2).

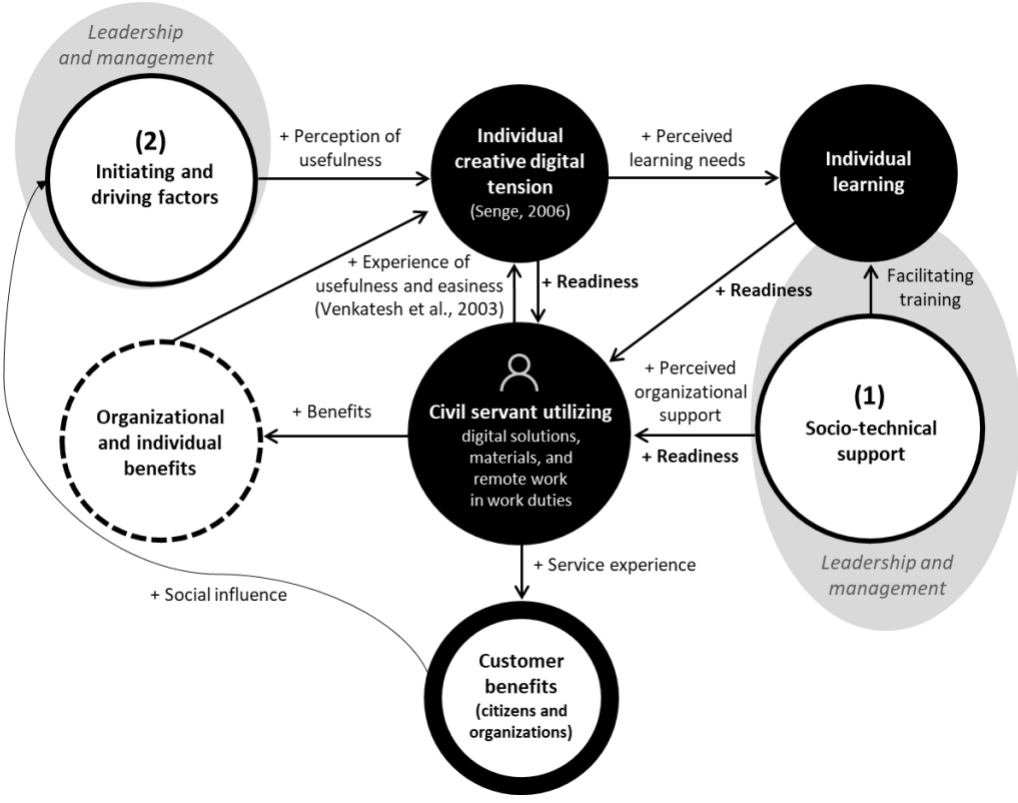
Civil servants can influence, to some degree, whether they work on-site or remotely. Municipality-specific rules regarding remote work varied. Most municipalities had municipal-level recommendations, such as two days a week remotely and three days in the office. Sometimes, work involves intense teamwork, which requires face-to-face meetings. In addition, printing requires going to the office. Due to the job description, remote work is not always possible. Not everyone takes advantage of it: "I don't do remote work. I haven't done it even during the coronavirus period" (P11).

Flexible remote work opportunities were also beneficial for municipality organizations. Working mainly remotely has enabled municipalities to recruit a suitable workforce hundreds of kilometers away: "Many municipalities have quite a hard time recruiting. So, [working almost entirely remotely] is one way... And the experiences have been positive" (P8).

Explanatory results: Mechanisms for supporting civil servants' digitalization readiness

Based on the interview data and using our theoretical framework, we identified two mechanisms enabling civil servants' digitalization readiness: (1) organizational resource mechanism, where socio-technical resources (e.g., infrastructure, peer support, IT support, and data management) affect work capabilities, and (2) creative digital tension mechanism, which activates through drivers including peer examples, skills assessments, state legislation, and perceptions of usefulness. Creative digital tension emerges as civil servants recognize gaps between current and desired capabilities, motivating learning and utilization of technologies (Figure 2).

Figure 2. Conceptual model for supporting civil servants' digitalization readiness in municipality organizations. Arrows suggest the principal directions of influence as observed in the interview data (applying Kurtessis et al., 2017; Rogers, 2003; Senge, 2006; Venkatesh et al., 2003)



The previous Findings section detailed the findings on the support factors (1) in Figure 2. The socio-technical support provided by an organization, such as available devices, software, and digital materials, is essential for daily operations in municipal land use planning and building permit processes. When civil servants perceive support in their work duties, their job satisfaction improves (Kurtessis et al., 2017).

> [Job satisfaction estimate from 4 to 10:] I'd give it a nine. I really enjoy my work. I have meaningful tasks to do, and the fact that I can, in a way, help move things forward... I'm satisfied with my work, and I'm motivated (P11).

Through socio-technical support and civil servants utilizing digital tools and materials, customer service has improved in some cases: "[After customer service shifted primarily to digital age] it seems that they are much more satisfied" (P10). With socio-technical support, organizations can achieve enhanced efficiency and productivity as tools and digital resources are utilized by civil servants:

> After a tough struggle, we finally got that electronic archive working, and it has now significantly improved work efficiency (P1).

> The city is certainly ready to promote these things (P11).

Initiating and driving factors (2) in Figure 2 activate creative digital tension mechanisms, including peer examples, skills assessments, state legislation, social influence, and perceptions of usefulness (Rogers, 2003; Venkatesh et al., 2003). Drawing from Senge's (2006) concept of creative tension, our analysis reveals how this mechanism manifests in civil servants' experiences:

> Especially if we get some concrete benefits from the programs, people get excited (P1).
>
> That's quite clear - when the law says [zoning maps] must be done in information model format, then it has to be learned (P8).
>
> I would continue this same approach, keeping the provision of services to residents at the center, specifically through digitalization (P3).
>
> If we want to work sensibly and well and be knowledgeable, then yes, we should have more training (P5).

In the context of constant changes brought about by digitalization, facilitated and self-directed learning emerge as a potentially vital factor in creating civil servants' digitalization readiness in both mechanisms (Cortellazzo et al., 2019; Höyng & Lau, 2023). Creative digital tension fosters a desire for learning, leading to self-directed or organized educational pursuits. As learning progresses, digitalization readiness can improve, facilitating more efficient utilization of digital solutions, datasets, and remote work capabilities in work duties. When the use of technologies is perceived as both beneficial and easy, creative digital tension intensifies (Venkatesh et al., 2003). This mechanism is intrinsically linked to digital innovations (Rogers, 2003).

> We also have this kind of digital mentoring in the city, so I feel my skills are sufficient for my work. I actually like using [open-source software name removed], for example, because it offers very broad possibilities for learning on your own (P4).

Leadership and management were needed in both mechanisms. Strong front-line leadership was a common wish concerning digital transformation efforts and the potential of civil servants' digitalization readiness to materialize. Some of the interviewees were not satisfied with the leadership related to digitalization. Leadership has an impact on factors such as job satisfaction and improved data security:

> It's always about leadership. And in a way, how people are led or... Well, handled... But perhaps leadership is a better term... There's room for improvement in that area (P2).
>
> In the end, it's the supervisor who has to take care of it. It comes from higher up (P7).
>
> About four years ago, the ICT director changed. He's very innovative. And brought in all kinds of new things. And data security has improved considerably… [From municipal senior leadership positions] I haven't met a single manager yet who has helped much with these [digitalization] issues (P10).

Our analysis revealed that the two support mechanisms operated bidirectionally, leading to strengthening or weakening cycles in civil servants' digitalization readiness. In the positive direction, when civil servants received adequate socio-technical support, for example, when they could influence choices about their technical infrastructure and industry-specific software, it enhanced their engagement with digital transformation and improved their digital abilities and preparedness. This positive cycle was self-reinforcing, as increased perceived support led to increased available tools and materials utilization. However, the mechanisms also operated negatively when, for example, civil servants faced excessive waiting times for IT support, when training required too much self-direction, or when software was difficult to use. A clear example of this negative cycle was seen in the remote work context: while supportive remote work policies enhanced both job satisfaction and digital tools and material adoption, restrictive policies actively decreased civil servant's overall job satisfaction. These findings suggest that socio-technical support is an enabler and a critical sustainer of civil servants' digitalization readiness.

Discussion

Our study contributes to two main discussions in public administration research. First, we add to the understanding of organizational support factors and mechanisms in public sector digital transformation (Haug et al., 2023; Mergel et al., 2019; Plesner et al., 2018). While previous research has, for example, identified various support factors (e.g. Bannykh & Kostina, 2021; Edelmann et al., 2023) and examined managerial practices in digital change (e.g. Van der Voet et al., 2016), our study describes how these factors operate in practice through civil servants' experiences. Previous public administration digitalization research from civil servants' perspectives has mainly focused on the dynamics between individuals and specific technological

solutions, like digital skills and consequences of software utilization (e.g., Gram, 2024; Gullberg & Svensson, 2020; Manana & Mawela, 2022). Based on our analysis of the interview data collected from the municipal technical sector in Finland's land use planning and construction supervision, we added a descriptive understanding of how organizational support mechanisms function in digitalization efforts.

Second, we contribute to public management literature by showing how organizational support and learning mechanisms function in the distinct context of public organizations, where statutory requirements and political oversight create unique conditions for digital transformation (e.g. Cordella & Tempini, 2015; Meijer, 2015; Mergel et al., 2019). Public organizations face specific constraints and enabling conditions that shape how support mechanisms operate (Gasco-Hernandez et al., 2022; Mergel et al., 2023).

In this study, perceived organizational support in digitalization was linked with civil servants' work satisfaction, productivity, and customer experience. Therefore, our findings align with previous research on perceived organizational support (Andersen et al., 2018; Eisenberger & Stinglhamber, 2011; Gigliotti et al., 2019; Kurtessis et al., 2017; Rhoades & Eisenberger, 2002). Perceived organizational support is important for the organization because it increases employees' readiness to accept work roles and perform well in their job duties (Cherns, 1976; Mumford, 2006). At the same time, our findings suggest that higher digital readiness might increase rather than decrease support needs. Most informants had good IT skills and consequently expressed high expectations for organizational support in further developing their digital capabilities.

Conclusions

Our main conclusion is that two key underlying intertwined mechanisms (Bhaskar, 2008) appear to support civil servants' digitalization readiness in municipal organizations. The first mechanism we identified comprises several socio-technical factors, such as technological infrastructure, peer support, IT support, effective data management, and facilitating relevant training – factors that previous public administration studies have associated with digital transformation (Andersson et al., 2022; Gasco-Hernandez et al., 2022). This socio-technical support was carried out mainly by municipal organizations. This aligns with studies emphasizing the interplay between social and technical elements in organizations (Lindgren et al., 2019; Mumford, 2006). The second mechanism is creative digital tension (applying Oberländer et al., 2020; Senge, 2006), which operates by recognizing gaps between current and desired states, driving perceived learning needs, and increasing civil servants' readiness to utilize digital solutions and materials in their work duties. This creative digital tension mechanism is activated by factors internal to the municipality organization, such as peer examples and skill assessments, and external factors, like mandatory legislation and social influence from citizens. The support factors and mechanisms we identified are intertwined and have technical and social elements (Herrmann, 2003; Mumford, 2006; Senge, 2006; Venkatesh et al., 2003). For example, peer support from colleagues involves technical (e.g., industry-specific software) and social elements (e.g., social interactions).

Several characteristics specific to the municipal context influenced how support mechanisms operated. First, regulatory requirements shaped digitalization: civil servants had to ensure compliance with legal obligations in digital service provision, maintain public access to information, and follow strict documentation processes. Legislative requirements that create mandatory digitalization influence the creative digital tension mechanism. While this legislatively driven tension can promote digital development, it may also create challenges. When digital solutions are implemented primarily to fulfill legislative requirements rather than address actual service needs, the tension might lead to resistance, reduced service quality, or inefficient work processes. Second, resource limitations affected implementation: municipalities faced budget constraints that restricted training opportunities and technology adoption decisions. Third, political and bureaucratic structures influenced operations: political approval and funding were necessary, while service production was compartmentalized between sectors. Fourth, established organizational practices impacted adoption: long-standing work

routines and long career paths in municipalities contributed to slower acceptance of digital changes.

At a practical level, our study demonstrates that municipal organizations should adopt strategies that provide needed technological tools and digital datasets, foster a supportive organizational culture, facilitate peer support, and invest in leadership that champions digital initiatives. Socio-technical support should be tailored to achieve at least a minimum level of digitalization readiness to do the job efficiently. Managers must understand and facilitate the processes through which these factors enable readiness. Rather than focusing solely on technology acquisition or civil servants' training, organizations should consider the interplay between technical infrastructure and social dynamics (Senge, 2006, 40). For example, peer support is most effective when it operates through both mechanisms: providing practical help (mechanism 1) and creating awareness of possibilities for improvement (mechanism 2).

Civil servants' digitalization readiness was context-dependent. For instance, an employee skilled in a particular software program needed support using other technology. Our findings indicate that civil servants with a positive attitude toward digitalization and who are technically skilled also need recognition, rewards, and support for their contributions (Giest & Raaphorst, 2018). Civil servants with substantive, technological, and social skills act as digital opinion leaders in advancing digitalization in municipalities. These digital opinion leaders or managers, especially in leadership positions with authority, serve as intermediaries between employees and the organization, functioning as peer supporters and internal change agents (Rogers, 2003) and consulting for top management, municipality trust, other public governance entities, and software vendors. On the other hand, the municipal organization should also ensure that digital competence in specific key software is not dependent on individual civil servants, as their departure could jeopardize the entire organization's expertise.

In conclusion, the study emphasizes the importance of systems thinking in achieving the benefits of digitalization and minimizing the drawbacks of utilizing technologies (Armenia et al., 2021). Facilitating and enabling conditions, which we studied through socio-technical support (Mumford, 2006), are essential for civil servants to operate and succeed in the ongoing individual, team, and organizational-level systemic change brought about by digitalization (Oberländer et al., 2020; Verhoef et al., 2021; Zavareh et al., 2018). Both internal organizational factors (such as leadership and peer support) and external factors (such as colleagues in other municipalities and software vendors) play essential roles in supporting civil servants' digitalization readiness. Municipal organizations don't need to offer perfect conditions but must define and provide at least the minimum prerequisites for civil servants' digitalization readiness potential to be realized. The role of available high-quality and historical data cannot be overstated: data management is the key to productivity and employee well-being in municipality service production (Irani et al., 2023; Lafioune et al., 2023). These insights contribute to the broader discourse on digital transformation in public sector organizations, offering evidence of the importance of a balanced focus on technological and social aspects to achieve successful digitalization and innovation outcomes (Bednar & Welch, 2020; Demircioglu & Audretsch, 2017; Hong et al., 2022).

For future studies, we encourage adding knowledge of the organizational context in individuals' work-life performance in digital transformation. As we presented a conceptual model for enabling civil servants' digitalization readiness, other researchers could use this as a guiding framework and develop it further. This would deepen our understanding of the connection between civil servants' digitalization readiness, customer experience, and public administration value creation. Recent research on digitalization in public administration has predominantly focused on implementing technologically advanced solutions such as artificial intelligence and automation (e.g., Attard-Frost et al., 2023; Larsen & Følstad, 2024; Schiff et al., 2022). While valuable, this technological focus often overlooks the systemic nature of digitalization, where changes in one organizational element (such as introducing new software) create ripple effects across work processes, skill requirements, and service delivery patterns in public sector organizations (Armenia et al., 2021; Cöster et al., 2023, xvi; Haug et al., 2023; Mergel et al., 2019). Therefore, we encourage future studies to utilize systems theoretical approaches to examine how organizational factors and mechanisms interplay in public

administration digitalization. This systems theoretical perspective could be particularly valuable when combined with complexity theory approaches to politico-administrative systems (Jalonen, 2024), helping to show how political decision-making processes (Kristensen, 2023) and administrative practices interact in digitalization.

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